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Annotated Bibliography on Tropospheric Propagation (–1952), p. 1243

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8 September 1957 No. 9

METEOROLOGICAL ABSTRACTS AND BIBLIOGRAPHY

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METEOROLOGICAL ABSTRACTS AND BIBLIOGRAPHY

MALCOLM RIGBY, Editor

Vol. 8 SEPTEMBER, 1957 No. 9

SPECIAL FEATURE IN THIS ISSUE

Annotated Bibliography on Tropospheric Propagation (–1952)

By

Wilhelm Nupen

Sponsored by the:

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(For complete table of contents see back cover)

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FOREWORD

Meteorological Abstracts and Bibliography is a monthly publication whose purpose is to bring to the attention of meteorologists current literature in their field and in related fields and to provide bibliographic information on various subjects, as interest demands.

Part I contains abstracts of current literature in the fields of meteorology, oceanography, etc., arranged according to the Universal Decimal Classification.

Part II of each issue comprises an annotated bibliography of important references on a special subject (usually arranged chronologically). No attempt is made to prepare exhaustive bibliographies; instead, the aim is to include a representative cross section of the various aspects of a subject.

Bibliographies published in the successive issues were:

Vol. I, 1950

1. Atmos. Pollution	2. Aerobiology	3. Cloud Physics	4. Hail
5. Tornadoes	6. Volcanic Dust	7. Climat. Changes	8. Thunderstorms
9. Icing	10. Acoust. Propagation	11. Evaporation	

Vol. II, 1951

1. Extended Forecast.	2. Long Range Forecast.	3. Soil Temp.	4. Constants, etc.
5. Clim. of Near East	6. Clim. of Middle East	7. Special Winds	8. Radar Storm Detect.
9. Condensation Trails	10. Clim. of N.E. Africa	11. Mountain Met.	

Vol. III, 1952

1. Clim. of N.W. Africa	2. Carbon Dioxide	3. Clim. of Argentina, etc.	4. Dew
5. Objective Forecast.	6. Stratus Forecast.	7. Urban Climatology	8. Clim. of C. Africa
9. Visibility	10. Glaze and Rime	11. Free Air Turbulence	

Vol. IV, 1953

1. Turbulence Theory	2. Turbulent Diffusion	3. Frost	4. Clim. of Australia, etc
5. High Level Winds	6. Winds in Stratosphere	7. Jet Stream	8. Radiation Bioclim.
9. Clim. of Pacific	10. Auroras	11. Sferics	

Vol. V, 1954

1. Oceanog. Met.	2. Clim. of S.E. Asia	3. Auroral Physics	4. Tropopause
5. Balloons	6. Numerical Forecast.	7. Radiation Data	8. Vertical Motion
9. Clim. of Arctic	10. Industrial Met.	11. Wind Waves and Swell	

Vol. VI, 1955

1. Bibliog. of Bibliog.	2. Texts & Monogr. Bibliogs.	3. Storm Surges
4. Ionospheric Prop.	5. Photochem.—Upper Atmos.	6. Cloud Physics
7. Radar Cloud Physics	8. Atmos. Nuclei (1841–1950)	9. Atmos. Nuclei (1951–1955)
10. Weather Modification	11. Cooling Power	

Vol. VII, 1956

1. Synoptic Met.-Arctic	2. Clim. of Enclosed Spaces	3. Cosmic Rays (–1952)
4. Cosmic Rays (1953–56)	5. Atmos. Radioactivity	6. Inversions
7. Snow Micromet.	8. Snow Micromet. (Suppl.)	9. Tropical Cyclones
10. Hurricane Damage	11. Tropical Cyclone Theory	

Vol. VIII, 1957

1. Solar Relations with Weather
2. Night Airglow
3. Forecasting of Special Elements
4. Forest Micrometeorology
5. Hydrometeorological Forecasting
6. Numerical Forecasting (Suppl.)
7. Albedo
8. Meteors
9. Tropospheric Propagation (–1952)

Other bibliographies in preparation are:

Actinometers
High Atmosphere Temperatures
Human Bioclimatology
Microwave Propagation
Ozone
Radio Astronomy
Singularities
Synoptic Aerology

Part III contains a listing of reviews, translations, reprints, and the contents of important publications. These are published in the earliest issue where space permits.

Part IV is made up of author, subject and geographical indexes. The December issue comprises cumulative author, subject, geographical and journal indexes.

EXPLANATIONS

Location of material: For each entry, a symbol is given for at least one library where the material may be found. The Union List of Serials (Gregory) is the source of most of the symbols used. In some cases, where no symbol has been assigned to a library, one will be devised according to the principles of the Union List.

Library symbols used frequently may be found in the following list:

DA:	U. S. Dept. of Agriculture Library, Washington, D. C.
DBS:	U. S. Bureau of Standards Library, Washington, D. C.
DGS:	U. S. Geological Survey Library, Washington, D. C.
DLC:	Library of Congress, Washington, D. C.
DN-HO:	U. S. Navy Hydrographic Office Library, Suitland, Md.
DNLM	U. S. National Library of Medicine, Washington, D. C.
DSI:	Smithsonian Institution Library, Washington, D. C.
DWB:	U. S. Weather Bureau Library, Washington, D. C.
GB-MO:	Great Britain, Meteorological Office Library, Harrow, England.
MH-BH:	Harvard University, Blue Hill Observatory Library, Milton, Mass.

Other symbols:

*	before an entry indicates a good data source.
†	before an entry indicates a good bibliography.
§	before an entry indicates a synoptic case history study accompanied by charts.

Geographic locations are in the English form rather than the form used locally, for example Moscow for Moskva.

Titles of articles or monographs are in the language of the original article unless otherwise stated. Slavic (Cyrillic) titles are transliterated into the Roman alphabet according to the Library of Congress transliteration scheme.

Abbreviations:

Titles of periodicals are not abbreviated, as a rule.

The months of the year from March to July are not abbreviated. Other months are abbreviated as Jan., Feb., Aug., Sept., Oct., Nov., and Dec.

The word or abbreviation for Volume (Tom, Band, Jahrgang, Año, etc.), for Number (Heft, Fascicule, Vypusk, etc.) and for page or pages is omitted from most entries. Thus an entry will read as follows:

Meteorologische Rundschau, 2(5/6):146–151, May/June 1950.

This indicates that the article appeared in *Meteorologische Rundschau*, *Jahrgang* 2 (Vol. 2), *Heft* 5/6 (No. 5/6), *pages* 146–151, May/June 1950.

PART I. ABSTRACTS OF CURRENT METEOROLOGICAL MATERIAL

MAJOR GENERAL WORKS

COLLECTED WORKS

8.9–1 550.3(02)

*†**Handbuch der Physik, Band 48, Geophysik II.** [Handbook of Physics, Vol. 48, Geophysics, Vol. 2.] Berlin, Springer-Verlag, **1957.** 1045 p. numerous figs., tables, foot-refs., bibliographies, and eqs. **DWB** (551.03 H236). (For listing of contents, *see* Pt. III, p. 1007, July 1957, *MAB.*) Review by B. Gutenberg in *Science,* Wash., D. C., 126(3270):408, Aug. 30, **1957. DLC.** Review by J. Bartels of each paper, in *Annales de Gèophysique,* Paris, 13(2):160–165, **1957. DLC**—This is one of the monumental works of the decade. Well (and expensively) bound, containing 17 comprehensive "reviews" of all available theoretical knowledge and quantitative data on meteorological, oceanographic, tidal and volcanological subjects of current interest: 1) Dynamic meteorology, 2) Radiation, 3) Visibility, 4) Polarization of skylight, 5) Rain or cloud drop diffusion, 6) Ozone, 7) Meteors, 8) Sound propagation, 9) Cloud physics, 10) Atom electricity, 11) Oceanography, 12) Ocean waves, 13) Tides, 14) Earth tides, 15) Tidal waves, 16) Atmospheric tides, 17) Physical volcanology. Each article is written by a recognized world author on the subject. Foot references and bibliographies, photographs and drawings, nomograms and data tables abound. Nine chapters are in English, 7 in German and 1 in French. A detailed subject index in English and one in German is appended. The handbook is of the same quality as the **Compendium of Meteorology,** though not quite as cumbersome. Another volume (Pt. III), will contain 16 articles on upper atmospheric phenomena (aurora, airglow, ionospheric winds, cosmic radiation, geomagnetism, etc.) also by outstanding scientists in each special field (NICOLET, J. KAPLAN, S. CHAPMAN, MEINEL, BARTELS, FERRARO and others). Also: **Handbuch der Physik.** [Encyclopedia of Physics.] (Prepublication advertising brochure, issued by Walter J. Johnson, Inc., 125 East 23 Street, N. Y. 10, N. Y.) This Encyclopedia began to appear in the fall of 1955. Consists of 54 volumes. Editor, S. Flügge. Publisher, Springer-Verlag, Barlin. Each volume variously priced and available separately: v. 48, **Dynamic Meteorology** and v. 49, **General Aeronomy,** from the group on Geophysics, issued in 1956. v. 46, **Kosmische Strahlung** (Cosmic Rays), to appear in 1957. Group X: Geophysics will consist of 3 volumes: Vol. 47, 1955; Vol. 48, 1956; and Vol. 49, 1956 with articles by over 30 outstanding geophysicists in the last 2 named volumes. Group XI, Astrophysics, Vol. 52 on Sun. It contains articles on solar and planetary atmospheres. *Subject Headings:* **1. Geophysics handbooks 2. Handbook of Geophysics 3. Geophysics. I. Flügge, S.**—*M.R.*

8.9–2 551.5:63

†*Protserov, A. V. (*ed.*), **Sel'skokhoziaĭstvennaia meteorologiia.** [Agricultural meteorology.] *Leningrad. Tsentral'nyĭ Institut Prognozov, Trudy,* 29(56), **1953.** 126 p. numerous figs. and tables. Refs. at end of each ch. **DLC**—The contents of this issue are devoted to special agricultural-meteorological studies carried out by the Central Institute of Forecasting for the Ministry of Agriculture of the U.S.S.R. which requested agrometeorological data for irrigation and grain production in the grain growing areas that are to be expanded in the Middle Volga region. The various studies are based upon agrometeorological data already available in the files of the Institute. Special new methods were devised to solve the various agrometeorological problems of this region. These include: 1) division of the calendar year into natural agricultural periods based upon temperature indices, 2) establishment of typical period crop growth on the basis of moisture conditions, 3) determination of the cause of destruction of winter crops at the time of injury, 4) determination of the amount of snow cover on a field, 5) frequency of sukhovei winds during the growth and reproductive period of winter and

summer crops. Solutions are given to the following problems: 1) the precipitation requirement of the interphase periods of growth of crops; 2) the mean and extreme dates of onset of the development phases of various crops; 3) determination of total evaporation during the developmental phases of summer and winter crops; approximate method for calcultating the sources of irrigation for summer crops, etc. The individual studies will be abstracted in *MAB*. (For listing of contents see Pt. 3, p. 550, April **1957,** *MAB*.) *Subject Headings:* **1. Agricultural meteorology 2. Agrometeorological research 3. U.S.S.R.**—*I.L.D.*

TEXTBOOKS

See also: **Weather** (Lehr et al.), 8.9–10; **Course in applied aerology** (Vialar), 8.9–20; **Dynamic oceanog.** (Zubov), 8.9–86; **Agric. hydrol.** (Schroeder), 8.9–271.

8.9–3 551.515.8(02) 551.5:551.49

Bleeker, Wouter and Van Duijnen Montijn, J. A., **Luchtsoorten en Fronten.** [Air masses and fronts.] 4th ed. *Netherlands.* (*K.*) *Meteorologisch Instituut, Opstellen op Oceanografisch Gebied,* (No.) 9b, **1955.** 125 p. 71 figs., 6 tables, refs. **DWB** (M:551.46 N4690)—This fourth edition of a handy textbook or manual for weather map analysis on shipboard (the first edition appeared in 1946), differs from the 3rd (1949) edition (*see* 4.11–130) only in the inclusion of the revised International Ship and Synoptic Code specifications effective Jan. 1, 1955 and a few notes on the effect of wind on sea level (after G. VERPLOEGH). The separate chapters are concerned with: I. Air masses, II. Vertical structure and stability, III. Water vapor (fog, clouds and precipitation), IV. Properties of warm and cold air masses, V. Fronts and frontal surfaces, VI. Frontal disturbances, VII. Frontless pressure systems, VIII. Analysis on ships. The appendices give the keys, codes and plotting specifications for marine meteorological charts. Numerous synoptic examples are included. *Subject Headings:* **1. Marine meteorology textbooks 2. International synoptic codes 3. Air masses 4. Fronts.**—*M.R.*

8.9–4 551.5(02)

Dubinskiĭ, G. P.; Gural'nik, N. N. and Mamikonova, S. V., **Meteorologiia.** [Meteorology.] Leningrad, Gidrometizdat, **1956.** 398 p. 190 figs. (incl. photos), map, 30 tables, 17 refs.—A basic, not-too-technical text on general meteorology for use by technicians in training courses or colleges. Chapters cover: I. General aspects, II. Atmospheric composition and structure, III. Pressure and density, IV. Solar, terrestrial and atmospheric radiation, V. Temperature of soil and water, VI. Air temperature, VII. Moisture, VIII. Condensation, IX. Precipitation, X. Wind and air currents, XI. Optical phenomena, XII. Acoustical phenomena, XIII. Atmospheric electricity. Modern concepts appear in most chapters, e.g., a section on rain making experiments, ionosphere, acoustical sounding of upper atmosphere, visibility, atmospherics, thermal balance of snow cover, etc. *Subject Headings:* **1. Meteorology textbooks 2. Meteorology.**—*M.R.*

8.9–5 551.594(02)

Israël, Hans, **Luftelektrizität und Radioaktivität.** [Atmospheric electricity and radioactivity.] Berlin, Springer Verlag, **1957.** 125 p. 86 figs., 6 tables, foot-refs.—This small up-to-date book contains 6 chapters on: I. General and instrumental aspects of atmospheric electricity; II. Physical and molecular aspects (ionization of gases); III. Aerosols (small ions, large ions, condensation nuclei, aerosols and weather); IV. Atmospheric electricity fields and currents due to turbulent exchange, thunderstorms or precipitation; V. Theory and application of atmospheric electricity fields and currents, climatological and synoptic and macroaspects; VI. Thunderstorm electricity (lightning and charge formation sferics); VII. Radioactive ionization, natural and artificial radioactivity in the atmosphere and VIII. Biological aspects of atmospheric electricity. A good subject index is provided. The book contains some data and numerous schematic diagrams. *Subject Headings:* **1. Atmospheric electricity textbooks 2. Radioactivity in the atmosphere 3. Thunderstorm electricity.**—*M.R.*

8.9–6 551.5(02)

Skliarov, Viktor Mironovich, **Meteorologiia dlia gidrometnabliudateleĭ.** [Meteorology for hydrometeorological observers.] Leningrad, Gidrometizdat, **1955.** 295 p. 111 figs.,

tables, 22 refs. **DLC** (QC871.555)—Review by A. N. Mikhailov, in *Meteorologiia i Gidrologiia*, No. 12:56–58, Dec. 1956. **DLC**—A nontechnical text on methods of observation of the various meteorological elements such as radiation, soil temperature, air temperature, humidity, condensation, fog, clouds, precipitation, snow cover, pressure, wind, optical and electrical phenomena, visibility and weather. Some of the basic principles of meteorology, synoptic and local forecasting are also covered. *Subject Headings:* **1. Meteorology textbooks 2. Observation techniques 3. Reviews. I. Mikhailov, A. N.**—*M.R.*

8.9–7 551.46(02):639.2:551.48(481)

Sverdrup, Harald Ulrik, **Havlaere: alminnelig havlaere Vannmasser og strømforhold utenfor norskekysten.** [Oceanography: general oceanography of water masses and currents of the Norwegian Coast.] Oslo, Fabritius, **1952.** 109 p. 43 figs., 5 tables. **DLC** (GC15.585)—A condensed text covering numerous aspects of practical oceanography or hydrography as applied to fishing or local navigation in Arctic or Atlantic coastal waters. Sounding for depth, measurement of waves, currents, temperature, gases, and salinity, ice, vertical currents, wind waves and currents, effect of coasts, tides, water masses of the Atlantic and various adjacent seas, temperature of coastal harbors, bottom temperature over banks, etc., discussed. Simple but effective schematic diagrams illustrate principle and theory as well as the actual observed currents, temperature distribution, etc. *Subject Headings:* **1. Oceanography for fishermen 2. Oceanography textbooks 3. Hydrography 4. Norway Coast.** —*M.R.*

8.9–8 551.556:551.46(02)

Titov, Lev Fedorovich, **Vetrovye volny na okeanakh.** [Wind waves in the ocean.] Leningrad, Gidrometizdat., **1955.** 126 p. 46 figs., 31 tables (*Nauchnopopuliarnaia Biblioteka*). **DLC** (GC211.T6)—A complete coverage of various aspects of sea waves, their development, forecasting and effects. Although intended for a broad reading public, the work does not neglect the technical aspects as evidenced by graphs, charts and data tables. Ch. I covers waves, wave motion and classification of waves; II, profiles, length, period and speed, energy, observation; III, research (historical), development, propagation, breakers, action of currents, ice, rain, oil, forecasting; IV. effects on coasts and effect of coasts on waves; V, observational methods; VI, geographical distribution and frequency in various seas. *Subject Headings:* **1. Wind waves at sea 2. Ocean waves 3. Popular meteorology textbooks.**—*M.R.*

8.9–9 551.5(02) 551.46(02)

Visser, Simon Wilhelm, **Beknopte inleiding tot de meteorologie, klimatologie, oceanografie.** [Brief introduction to meteorology, climatology and oceanography.] Groningen, J. B. Wolters, **1951.** 252 p. 102 figs., 38 illus., bibliog. p. 247. **DLC** (QC863.V56)—This textbook is an outgrowth of lecture notes for geography students. The mathematical and physical aspects of meteorology, climatology and oceanography are emphasized in the 27 chapters, comprising those 3 major parts of the text. The geographical aspects are not neglected, but play a minor role in comparison with most textbooks of this type. Such modern subjects as microclimatology, bioclimatology and evapotranspiration are treated incidentally. *Subject Headings:* **1. Meteorology 2. Oceanography 3. Climatology 4. Textbooks 5. Dutch language.**—*M.R.*

8.9–10 551.5(023)

Lehr, Paul E.; Burnett, R. Will and Zim, Herbert S., **Weather: air masses, clouds, rainfall, storms, weather maps, climate.** Illus. by Harry McNaught. N. Y., Simon and Schuster, **1957.** 160 p. numerous figs. (many in color), 9 refs. (*A Golden Nature Guide*).—An up-to-date elementary pocket guide to meteorological phenomena and processes, with beautiful and original colored illustrations on every page. The 12 chapters cover: 1) what makes the weather; 2) rain, rainmaking, snow, dew and frost; 3) atmosphere and its structure and composition; 4) planetary aspects of weather; 5) highs and lows; 6) air masses of North America and their role in weather; 7) fronts and attending weather; 8) storms; 9) forecasting; 10) weather maps; 11) weather and climate; 12) books about the weather. Information on the U. S. W. B. and on instruments for observing weather and on weather maps of various types,

including machine made synoptic cards, is found in Ch. 9 and 10. The booklet is one of a series of the popular **Golden Nature Books** (on birds, flowers, trees, stars, etc. intended for imaginative school children and prepared by authoritative scientists). The latest models or explanations of the usual phenomena (thunderstorms, tornadoes, hurricanes, auroras, the tropopause, jet stream, ionosphere, exosphere, noctilucent clouds, hail, glaze, albedo, solar influences, radar, etc.) are presented with clever illustrations or photographs and concise factual text. A good detailed subject index is appended. *Subject Headings:* **1. Elementary meteorology 2. Popular meteorology textbooks.**—*M.R.*

POPULAR METEOROLOGY

See also: **Wind waves at sea** (Titov), 8.9–8; **Romance of the Gulf Stream** (Leip), 8.9–81.

8.9–11 551.5(09)

Marshak, Il'ia Iakovlevich, **Chelovek i stikhiia.** [Man and the elements.] 4th ed. Moscow, Izdatvo. Molodaia Gvardiia, **1954.** 335 p. 2 figs. **DWB, DLC**—The fourth edition of this popular (75,000 copies printed) book contains a few extra paragraphs relating to recent developments in weather control, automatic weather stations, etc. A fanciful speculation on what might happen if a "corporation for rainmaking" allowed individuals to "buy" the kind of weather they wanted, is followed by an equally visionary plan for control of weather by a government agency for the best interests of all members of societies. The remainder of the book, written in a highly literary style, remains only slightly changed. It takes up the history of the various branches of meteorology, oceanography, hydrology, present applications and methods of observation, forecasting, climatological analysis, uses in war and peace and on land, sea and in the air. (For 1st ed. 1948, *see* 3.9–12, Sept. 1952, *MAB*; for Bulgarian translations of various chapters, *see* 3.4–14, –15 and –43, March 1952, *MAB*.) *Subject Headings:* **1. Elementary meteorology 2. History of meteorology 3. Popular science books.**—*M.R.*

8.9–12 551.46(023)(09)(263)

Chapin, Henry and Smith, F. G. Walton, **The ocean river.** New York, Scribner, **1952.** 325 p. illus., bibliog. (5 unnumbered pages between p. 308 and 309). **DLC** (GC296.G9C45)—A popular book summarizing in 14 vivid chapters the general knowledge of the Atlantic Ocean and especially the Gulf Stream. Origin of the oceans, the Atlantic Ocean, man's navigation of the sea, early voyages across the Atlantic, early charting of the Gulf Stream and other currents used in sailing, causes of the Gulf Stream (meteorological), fishing, slave trades, explorations, whaling and codfish fleets, change from sail to steam, and future uses of the ocean and currents are among the subjects discussed. The book combines the historical, narrative, fanciful, practical and scientific in a balanced manner. *Subject Headings:* **1. Popular oceanography 2. Gulf Stream 3. History of oceanography 4. Atlantic Ocean.**—*M.R.*

MANUALS, ATLASES AND HANDBOOKS

See also: **Handbook of Physics,** 8.9–1; **Ocean current calculations** (Zubov, Mamaev), 8.9–86; **Weather, climate and agric.** (Kramer et al.), 8.9–101.

8.9–13 551.582.3(265/266)

U. S. Office of Naval Operations, **U. S. Navy Marine Climatic Atlas of the World, Vol. 2, North Pacific Ocean.** Its *NAVAER* 50-1C-529, July 1, **1956.** xvii p.+275 charts (in color) 50×34 cm. **DWB** (M82.3 U585a)—This is the second in a set of marine atlases for the oceans of the world. Vol. I for the North Atlantic was published in Nov. 1955 (*see* 8.5–81, May 1957, *MAB*). The present atlas follows the same pattern with almost no changes. Sources of data, radiosonde stations, methods of compilation and a description of each set of charts appears in text. Charts of surface winds, gales, visibility, precipitation, cloudiness, ceiling and visibility, temperature, wet bulb temperature, low temperature, pressure, air-sea temperature differences, low-pressure centers, aid and retard wind, wind roses, height of pressure surfaces (850, 700, 500, 300 and 200 mb), temperature and humidity at 850, 700 and 500 mb; modified refractive index, inversions, height of tropopause and of freezing level and potential aircraft wind are included. Some of the charts consist of isopleths and wind roses or

histogram paste-ups for individual stations. Others comprise only curves or statistical presentations for the annual regime. *Subject Headings:* **1. Marine climatic atlases 2. Upper air frequency charts 3. North Pacific. I. U. S. Weather Bureau.** —*M.R.*

8.9–14 551.582.3(81)

*Brazil, Conselho Nacional de Geografia (*and*) Brazil. Serviço de Meteorologia, **Atlas Climatológico do Brasil, Vol. 2, Frequencias-fenômenos.** [Climatological atlas of Brazil, Vol. 2, Frequencies, phenomena.] Rio de Janeiro, **1956.** Charts, 222–433. 37×36 cm. (For Vol. 1, *see* 7.7–9, July 1956, *MAB.*) **DWB**—This second volume of the **Climatic Atlas of Brazil** contains 212 maps of frequencies of various phenomena based on normals from 371 stations with periods of record up to 32 years. For each element there are 13 charts (12 monthly and 1 annual). The elements are: wind roses (direction to 8 pts.), calms, days with rain of >0.1 mm, >1.0 mm and >10 mm, days with fog, thunderstorms, haze, dew, winds of gale force, clear days, cloudy days, hot days (>25°C), warm nights (minimum >20°C), freezing (<0°) and ice days. Charts are nicely drawn and the volume is well bound. However the legends on the rainday charts are confusing. *Subject Headings:* **1. Climatic atlases 2. Climate of Brazil 3. Brazil. I. Serra, Adalberto.**—*M.R.*

8.9–15 551.582.3(485)

*Svenska Sällskapet för Antropologi och Geografi, Stockholm, **Atlas över Sverige.** [Atlas of Sweden.] Ed. by Magnus Lundqvist, Carl Julius-Anrick et al. Printed by Kartografiska Institutet, Stockholm, issued by the Generalstabens Litografiska, Anstalts Förlag [of Sweden], Stockholm, **1953–.** Issued in sections. 44 cm. Section 25–26, Ångström, Anders: **Temperatur, humiditet.** [Temperature, humidity.] 7 p. 6 figs., table, 16 maps (in color). English summary p. 6–7. Section 29–30, Wallén, C. C., **Nederbörd.** [Precipitation.] 5 p. 2 figs., 16 maps (in color). English summary p. 5. **DWB** (M82.3A881), **DLC** (G2070.5H 1953, Map Div.)—Monthly charts for Sweden of mean temperature for 1901–1930, and charts showing difference between mean temperature in Jan. and July, the coldest Jan. or Feb during 1901–30, the hottest July (1901–30) and the relative humidity during the vegetation period are presented in many colors. Histograms show monthly temperature and precipitation at 18 stations in Sweden. Curves showing smoothed annual temperature regime for each degree of latitude from 55° to 69°N, charts showing temperature anomalies for June and Dec., etc., are included along with ample text describing the climate, temperature and humidity regime in Sweden. Each chart is annotated. A table shows temperatures and precipitation at a number of places around the world having the same latitude as Sweden. *Subject Headings:* **1. Climatic atlases 2. Temperature data 3. Sweden. I. Lundqvist, Magnus** (*ed.*) **II. Julius-Anrick, Carl** (*ed.*) **III. Ångstrom, Anders IV. Wallén, C. C.**—*M.R.*

8.9–16 551.5:03

Brazol, Demetrio, **Dictionary of meteorological and related terms. Part I, English-Spanish. Part II, Spanish-English.** 1st ed. Buenos Aires, Libreria Hachette, **1955.** 557 p. **DWB.** Review by J. M. Rubiato and O. M. Ashford in *World Meteorological Organization, WMO Bulletin,* 5(3):122, July **1956. DWB**—Meteorological terms and phrases are arranged in groupings corresponding to the main divisions of the Universal Decimal System for meteorology. The coverage is remarkably thorough, as evidenced, for example, by the inclusion of numerous semi-colloquial expressions used in synoptic and air mass analysis not found in American and British glossaries. The meteorological section is followed by a generous sampling of terms in related fields such as oceanography, astronomy and telecommunications. Many statistical terms are included. The appendices contain conversion tables for metric and English units, as well as a glossary of selected terms, with detailed definitions and/or historical and etymological notes (in Spanish only). *Subject Headings:* **1. Meteorological glossaries 2. English-Spanish glossaries 3. Spanish-English glossaries.**—*R. S. Quiroz.*

8.9–17 551.579(02) 546.212:543

†Alekin, Oleg A., **Khimicheskiĭ analiz vod sushi (pri statsionarnom ikh izuchenii).** [Chemical analysis of continental waters for stations studying them.] Leningrad, Hidromet. Izdatvo., **1954.** 199 p. 37 figs., 26 tables (+tables in appendix), 95 refs., eqs. **DLC**

(QD142.A39)—A detailed guide for sampling and chemical analysis of the pH, CO_2, O_2, Fe, NO_2, NO_3, P, Si, NH_4, HCO_3, Ca, Mg, SO_4 and Cl content of river, well, lake, underground (and by analogy, rain) water at hydrometeorological stations or laboratories in the U.S.S.R. Physical properties (transparency, color, temperature, viscosity, ion concentration, etc.) are also treated. Where different methods may be used, all are fully described. Equipment is illustrated, and tables, graphs, nomograms, and theory presented for practical use. A good bibliography of Russian sources is also included. *Subject Headings:* **1. Chemical analysis of water 2. Chemical analysis of rainwater 3. Hydrochemical manuals.**—*M.R.*

8.9–18 551.582(262,495,496,499,56):629.12

Great Britain. Hydrographic Dept. **Mediterranean Pilot, Vol. 4, Comprising the islands of the Grecian Archipelago, with the adjacent coasts of Greece and Turkey from Ákra Taínaron on the West to Alobi Burnu on the East, including also the Island of Kriti.** 8 ed., London, **1955.** iv+594 p. 41 plates, tables. **GB-MO**—**Meteorology** p. xl–lv. **Climate** p. 21–38 with the usual climatic tables for coastal and island stations. *Subject Headings:* **1. Climate of Mediterranean 2. Climate of Grecian Archipelago 3. Mediterranean 4. Grecian Archipelago.**

8.9–19 551.58:63(02)

*U.S.S.R. Glavnoe Upravlenie Gidrometeorologicheskoĭ Sluzhby. Moskovskoe Upravlenie, **Agroklimaticheskiĭ spravochnik po moskovskoĭ oblasti.** [Agroclimatic handbook for the Moscow Oblast.] Leningrad, Gidrometizdat, **1954.** 191 p. 16 figs. (some fold.), 140 tables, 25 refs. **DLC** (QC989.R4735)—An excellent compilation and analysis of all available climatic data for the Moscow Oblast with respect to agricultural operations. The text contains scores of illustrative tables and charts, many large folded charts for the region. In addition these are 30 pages of climatic, soil moisture and soil freezing data appended. The various chapters cover air temperature; precipitation, thunderstorms and dew; humidity and evaporation; wind; solar radiation and cloudiness; soil moisture, soil temperature, freezing of soil, snow cover and blizzards, river regimes (freezing and break-up, floods, irrigation), phenological data for various crops, agroclimatic periods or season, and zones or subregions. Data analysis is based almost entirely on frequency distributions rather than means. A great deal of imagination has gone into the work. (Review by A. M. Shul'gin in *Meteorologiia i Gidrologiia*, No. 1:56–57, Jan. 1957.) *Subject Headings:* **1. Agroclimatology handbooks 2. Soil temperature data 3. Phenological data 4. Moscow Oblast, U.S.S.R.**—*M.R.*

8.9–20 551.509.317(02)

Vialar, J., **Cours d'exploitation aérologique.** [Course in applied aerology.] Paris, Ministère des Travaux Publics, des Transports et du Tourisme, Secrétariat Général à l'Aviation Civile et Commerciale, **1954.** 178 p. 65 figs., forms, eqs. **DLC** (TL556.V47)—An advanced course in aerological analysis for synoptic and dynamic meteorological practice and research. Ch. I covers thermodynamic theory and diagrams; Ch. II, extracting data from radiosonde reports; III, stability and instability; IV, modification of air masses; V, use of soundings to analyze air masses; VI, upper air charts of all types, including prognostic use of upper air charts; appendix contains code forms for upper air transmissions-prontours. Many actual examples are worked out and presented on actual (large and small) adiabatic and synoptic charts. *Subject Headings:* **1. Upper air analysis manuals 2. Textbooks 3. Thermodynamic charts.**—*M.R.*

MONOGRAPHS AND COMPREHENSIVE PAPERS

See also: **Geog. study, Antarc.** (Kosack), 8.9–38; **Arctic bibliogs.** (Arctic Inst.), 8.9–60; **Phosphorescence** (Tarasov), 8.9–85; **Synoptic met. of tropical Atlantic** (Delourme), 8.9–144; **General circulation, N. Hemisphere** (Teich), 8.9–170; **Middle tropospheric circulation, N. Hemisphere** (Grünewald), 8.9–173; **Atmos. radiation** (Godson), 8.9–185; **Sea breeze models** (Pierson), 8.9–220; **Acoustical phenomena** (Ertel), 8.9–329.

8.9–21 551.593.63:551.578.41:91.04(99)

†Liljequist, G. H., **Halo-phenomena and ice-crystals (Maudheim, 71°03′S, 10°56′W).** *Norwegian-British-Swedish Antarctic Expedition, 1949–1952, Scientific Results*, Vol. 2, Pt. 2A,

pub. Oslo, Norsk Polarinstitutt, **1956.** 85 p. 69 figs., 27 tables, 11 plates. **DWB**—A magnificent analysis and compilation of statistical, theoretical, physical, observational and photographic data obtained on the Maudheim expedition in 1950 and 1951, concerning low level, middle level and high level halo and associated optical phenomena. An average of 117 halos were observed each year at Maudheim (71°03′S, 10°56′W), the greatest number ever observed on any arctic expedition. Maximum frequency was in spring (secondary maximum in autumn) and minimum in summer (secondary minimum in winter). Lunar halos were most frequent in winter and least frequent in summer. Low level halos (produced in frost fog) were more frequent than middle or high level halos, and the most elaborate halos were observed in frost fog or mist. High halos were usually simple 22° rings or vertical pillars (when sun was below horizon). Low halos were not observed in summer and were most often seen at temperatures of −25° to −30°C. Methods of production of halos were analyzed and the geometrical theory developed for 1) ring group of halos (22° halos, etc.), 2) plate group (parhelia and paraselenae), 3) column group (tangential arcs), and 4) halos produced by pyramidal crystals. Microphotographs of ice crystals associated with the various types of halos were obtained during the second year (1951) and many are reproduced in the monograph. This study makes possible the estimation of the optical frequency of various crystal types at various temperatures and cloud levels. Snow crystals cannot produce halos but can act as sublimation nuclei for the production of ice-crystal forms. In addition to the 12 types of halo "components" observed and studied, the water cloud (fog bow) phenomena was described. A third of the monograph (p. 61–85) consists of detailed description and drawings of the halos observed during 1950–51 and of the ice crystals observed in 1951 and the conditions attending same. Photographs, drawings, histograms and tables are profusely scattered throughout the text. *Subject Headings:* **1. Halos 2. Ice crystal photographs 3. Maudheim Expedition, 1949–52 4. Maudheim, Antarctica. I. Norwegian-British-Swedish Antarctic Expedition, 1949–1952.**—*M.R.*

8.9–22 551.515.8(94)

*Berson, F. A.; Reid, D. G. and Troup, A. J., **The summer cool change of South-Eastern Australia, Pt. 1, General behaviour.** *Australia. Commonwealth Scientific and Industrial Research Organization. Div. of Meteorological Physics, Technical Paper*, No. 8, **1957.** 48 p. 12 figs., 8 tables. **DWB**—The structure, movements and statistics of the cool changes or summer cold fronts that affect S.E. Australia were studied intensively by the Division of Meteorological Physics of the Commonwealth Scientific and Industrial Research Organization, Australia, during 1953–4 and 1954–5 (and since) and the results of the analysis of 50 such passages summarized in detail in this monograph. The nature of the cool change is described and shown statistically for a number of low, and a special high, level stations and for districts. Diurnal changes, pressure gradients which change diurnally, changes in lower troposphere, temperature and moisture contrasts, analysis of soundings, horizontal flow, shear, upper flow, etc. are treated. *Subject Headings:* **1. Cold fronts in Australia 2. Australia.**—*M.R.*

8.9–23 551.506:551.524.37:551.525.2(71)

*Boughner, C. C.; Longley, R. W. and Thomas, M. K., **Climatic summaries for selected meteorological stations in Canada, Vol. 3, Frost data.** Toronto, Ontario, (Meteorological Div., Dept. of Transport), **1956.** 94 p. mostly tables. charts, 14 refs. Price: $.30 from Queen's Printer, Ottawa, Ontario.—Charts and tables show dates or probabilities of frost (32°F or lower) in autumn and spring, and length of growing season at over 1200 stations in all parts of Canada. Another table gives number of freezing days per month at 142 stations. Histograms show percentage frequency of dates of first autumn or last spring frost at 55 stations by weeks. At a few (11) stations the length of the frost-free period is given in terms of the grass minimum temperatures and the difference between grass and screen temperature and dates vividly revealed. Temperature differences average 6 to 8°F, dates 2 to 6 weeks and growing season from 2 weeks in Quebec to 2 months in British Columbia. *Subject Headings:* **1. Frost data 2. Grass minimum temperature data 3. Canada.**—*M.R.*

8.9–24 551.585(529):551.571

†*Chen, Cheng-Siang (*Dir., of Institute. National Taiwan Univ.*) and Huang, Tsung-Hui (*Student, Sec. of Applied Climatology*), **The climatic classification and moisture belts in Taiwan.**

Taipei. National Taiwan Univ. Fu-Min Geographical Institute of Economic Development, Research Report, No. 67, **1956.** 28 p. figs., maps, 4 tables, 24 refs. In Chinese; English summary p. 22. **DWB**—Data for 100 stations evenly distributed throughout Taiwan, all with 10 (temperature) or 20 (rainfall) to 55 years of record, are compiled and presented in tables, charts and colored maps to show the climatic types according to Thornthwaite's new classification. The potential evapotranspiration, water surplus or deficiency, moisture index and moisture belts, seasonal variation of effective moisture, thermal efficiency and climatic type, etc. are analyzed in detail. It is concluded that the system used here (THORNTHWAITE's) is better suited to the agricultural practice in Formosa than is the Köppen system. *Subject Headings:* **1. Climatic regions of Formosa 2. Thornthwaite's classification 3. Moisture belts 4. Taiwan.**—*M.R.*

8.9–25 551.582.2(44)

§†*Estienne, Pierre, **Recherches sur le climat du Massif Central français.** [Investigations on the climate of the Massif Central, France.] *France. Météorologie Nationale, Mémorial,* No. 43, **1956.** 242 p. 56 figs., 42 tables, refs., bibliog. p. 213–219 (282 refs.). **DWB** (M055.F815m)—A thorough and elaborate study of all of the aspects of the regional and local climates of the Central French Highlands using a wealth of geographical, geomorphological, hydrologic and meteorological reference material (1872–1954) and including numerous tables of illustrative data and charts, graphs, etc. The local climates (temperature, rainfall, hail, cold waves, snow, frost, heat waves, thunderstorms, inversions) of each sub-region are treated in detail in separate chapters. In addition there is a section on dynamic climatology (considering air movements and synoptic types) and a discussion of the diurnal and seasonal regime, effect of altitude and exposure (aspect of slope), forests, climatic changes in post glacial and recent time and a host of other subjects. *Subject Headings:* **1. Climate of the Massif Central, France 2. Synoptic climatology 3. Long period records 4. Massif Central, France.**—*M.R.*

8.9–26 551.582.2(672)

France. Météorologie Nationale, **Aperçus sur la climatologie de L'A.E.F.** [Review of the climatology of French Equatorial Africa.] Its *Monographies,* No. 1, Nov. **1956.** 21 p. figs., tables. **DWB** After a brief outline and discussion of the local and seasonal climatic characteristics of French Equatorial Africa (the relation of the Intertropical Convergence in Jan. and Aug. to circulation and weather elements, and to horizontal distance, shown schematically), there are a number of "climatic guides" for principle locations (Brazzaville, Pointe-Noire, Libreville, Port-Gentil, Bangui, Fort-Lamy, Abéché and Fort-Archambault). Each guide (2 pages) gives main seaonal characteristics, flying weather conditions, rain, surface winds, miscellaneous statistics (thunder, temperature, vapor pressure, rainfall), wind roses and histograms of mean and extreme rainfall. *Subject Headings:* **1. Climate of French Equatorial Africa 2. French Equatorial Africa.**—*M.R.*

8.9–27 551.510.41:551.521.31

*†Ghosh, S. N. and Edwards, H. D., **Rotational frequencies and absorption coefficients of atmospheric gases.** *U. S. Air Force. Cambridge Research Center, Air Force Surveys in Geophysics,* No. 82, March **1956.** 29 p. numerous tables, refs., eqs. **DWB, DLC**—Tables and diagrams are presented to give operational data (for radar investigations) on rotational frequencies and absorption coefficients of O_2, N_2O, NO_2, CO, O_3, H_2O and SO_2 for $J=1$ to 12. Data are computed from molecular parameters now available and sources of data are carefully cited. Data for 10,000 to 100,000 Mc are presented graphically for use in investigations of absorption characteristics of the atmosphere. Absorption characteristics are calculated for 300°K. *Subject Headings:* **1. Rotational frequencies of atmospheric gases 2. Absorption coefficients.**—*M.R.*

8.9–28 551.543.1:525.6

*Haurwitz, Bernhard, **Geographical distribution of the solar semidiurnal pressure oscillation.** *N. Y. Univ. College of Engineering, Meteorological Papers,* 2(5), Dec. **1956.** 36 p. 10 figs., 3 tables, 10 refs., 10 eqs. List of sources (of data), p. 16–17. **DWB, DLC** (QC852.N4)—Data from 296 stations in both N. and S. Hemispheres and at all latitudes (very few in

Arctic and Antarctic) are presented and analyzed to show magnitude and phase of the solar semidiurnal atmospheric tide. The values range from <.1 mb amplitude at or north of 60°N or S to 1.10 to 1.40 mb or more at the equator. Values of amplitude are shown on one chart and phase on another. The standing wave (Z_2) is more important at the equator and the wandering wave (W_2) at the polar regions. Geographical and time variations and interrelations of the W_2 and Z_2 components of S_2 are discussed and charted. *Subject Headings:* **1. Solar semidiurnal pressure waves 2. Semidiurnal pressure waves 3. Global pressure oscillations 4. Earth.**—*M.R.*

8.9–29 551.515.13

†Klein, William H. (*Extended Forecast Section, U. S. W. B., Wash., D. C.*), **Principal tracks and mean frequencies of cyclones and anticyclones in the Northern Hemisphere.** U. S. Weather Bureau, Aug. **1956.** 123 p. 28 figs., 72 charts, 6 tables, 130 refs. **DWB** (M15.13 U587p) —The detailed history of cyclone and anticyclone track charts, sources of data and processing of material, regional aspects of cyclone and anticyclone frequency, month by month, annual course of hemispheric frequencies of days with cyclone or anticyclone, numbers of cyclones or anticyclones, cyclogenesis or anticyclogenesis, latitudinal profiles and zonal circulation, applications and finally the 72 charts of the N. Hemispheric distribution of frequency of occurrence, average speed and duration, regions of genesis and principal tracks are presented. Sources are tabulated. *Subject Headings:* **1. Cyclone frequencies 2. Anticyclone frequencies 3. Storm track charts 4. Cyclonic storm tracks 5. Northern Hemisphere.**—*M.R.*

8.9–30 / 551.515.1:551.513.3(491)

§Mertins, H. O. (*ed.*), **Sturmwetterlagen bei Island, 1950 1954, 1. Synoptischer Teil 2. Statistischer Teil.** [Storm situations near Iceland, 1950 1954, Pt. 1, Synoptic volume. Pt. 2, Statistical volume.] *Hamburg. Seewetteramt, Einzelveröffentlichungen*, No. 12, **1957.** 24 p. 40 figs., tables, 22 diagrams. **DWB.** Review by H. O. Mertins in *Wetterlotse*, No. 114/115:81–84, March **1957. DLC.** Review by Dr. Pflugbeil in *Der Seewart*, 18(3):133–135, **1957. DWB**—A monographic study of the cyclones and attending wind and gale conditions in the fishing region around west, south and east Iceland. The number, duration, frequency per month and year and by wind directions of cyclones and gales of various strengths are computed and presented in graphs, charts and tables for several regions and several cyclone "types" or phases. The statistics are compiled from records made on the "Meerkatze"—a fishing patrol boat, operating for 5½ years (1950–54) in the Iceland region. Twelve of the 50 voyages were winter voyages on which the author made personal observations of storm types and conditions. A total of nearly 13,000 3-hourly weather maps were examined in compiling the elaborate statistics. Typical and exemplary synoptic charts (500 mb, surface and schematic frontal and track charts) are presented for a dozen series representing the here defined types. The charts are discussed in connection with weather on the fisheries. The "mean" Icelandic Low is the result of numerous travelling depressions broken by shorter periods of anticyclonic weather. Winds of force 10–12 are frequent in winter cyclones. *Subject Headings:* **1. Icelandic Low 2. Icelandic depressions 3. Cyclone studies 4. Synoptic case histories 5. "Meerkatze" 6. North Atlantic 7. Icelandic Seas.**—*M.R., C.E.P.B.*

GENERAL GEOPHYSICS AND METEOROLOGY

GENERAL GEOPHYSICS

See: **Handbook of Physics,** 8.9–1.

ARCTIC RESEARCH

See also: **Arctic bibliogs.** (Arctic Inst.), 8.9–60; **Ice conditions, Denmark Strait** (Mertins), 8.9–88; **Synoptic met. of polar regions,** 8.9–305.

8.9–31 551.557(988):551.524.7(988)

*Bedel, Bernard, **Les observations météorologiques de la Station Française du Groenland 70°55′93″N —40°38′22″W —Altitude 2993 m: Conditions atmosphériques en altitude du 17**

septembre 1949 au 10 août 1951. [Meteorological observations at the French Greenland Station: atmospheric conditions aloft Sept. 17, 1949–Aug. 10, 1951.] *Expéditions Polaires Françaises, Expeditions Arctiques, Résultats Scientifiques, Ser. N. V.* [*Meteorologie*], [unnumbered report], Paris, **1954.** 119 p. 59 figs., numerous tables, refs. **DWB**—This elegant volume contains charts, graphs, tables and text describing the personnel, location, history, equipment, methods of observation, and actual data to 12 km from upper air wind (pilot balloon) and radiosonde (METOX) observations to 100 mb for both standard heights, standard isobaric surfaces and characteristic points; graphs of daily soundings and mean monthly curves of temperature, typical curves in Arctic, Polar and tropical air, studies of situations involving disappearance of inversion in winter and of tropopause, for 1949–51 at the Central Station on Greenland. *Subject Headings:* **1. Upper air winds 2. Upper air temperatures 3. French Greenland Station, Greenland.**—*M.R.*

8.9–32 551.506.7(47)

*Gaĭgerov, S. S., **Nekotorye rezul'taty aerologicheskikh nabliudeniĭ na dreĭfuiushcheĭ stantsii "Severnyĭ Polius-4" letom 1955 g.** [Some results of aerological observations on the drifting station "Severnyi Polius-4" in the summer of 1955.] *Meteorologiîa i Gidrologiîa*, Leningrad, No. 6:3–13, June **1956.** 6 figs., 2 tables. **DWB, DLC**—The contents of this aerological study include an examination of the vertical structure of cyclones and of atmospheric fronts, the height of the tropopause, temperatures of the tropopause and of the lower stratosphere and aerological conditions associated with the formation and dissipation of low level cloudiness and fogs. Aerological charts and graphs are presented. *Subject Headings:* **1. Upper air data 2. Tropopause data 3. Fog dissipation 4. Vertical structure of fronts 5. "Severnyi Polius" Expedition, 1955 6. Arctic Ocean.**—*I.L.D.*

8.9–33 551.311.17:551.582(988)

†Georgi, Johannes, **Das Klima des grönländischen Inlandeises und seine Einwirkung auf die Umgebung.** [Climate of the Greenland Ice Cap and its effect upon the surroundings.] *Naturwissenschaftlicher Verein zu Bremen, Abhandlungen*, 31(2):408–467, **1939.** 13 figs., 7 tables, 51 refs. **DLC**—A comprehensive treatment of the climatic factors that have produced the Greenland Ice Cap and its influence upon the formation of the glacial anticyclone. This article contains a review of the literature dealing with the origin of the glacial anticyclone during the glacial epochs and the periglacial climatic effects, the role of precipitation in glaciation, the climatic effect of an ice cap, the wind conditions on the Greenland ice cap, synoptic maps and winds aloft over the ice cap, and various special aspects of climate of the ice cap including precipitation and evaporation, daily variations of the surface wind and of the temperature at 2m above the ground, and the solar radiation at Eismitte. Tables and graphs with meteorological data are included. *Subject Headings:* **1. Greenland Ice Cap 2. Glacial anticyclones 3. Greenland.**—*I.L.D.*

8.9–34 551.501.9(98)

Norwegian Arctic Weather stations in 1956. *Polar Record*, 8(56):451–452, May **1957.** fig. **DLC**—Map shows Jan Mayen, Myggbukta, Bjørnøya and stations in Spitzbergen, history is given. Five publications are listed. *Subject Heading:* **1. Arctic weather stations.**—*C.E.P.B.*

ANTARCTIC RESEARCH

See also: **Halos and ice crystals, Maudheim** (Liljequist), 8.9–21; **IGY Antarc. program** (Gould), 8.9–39; **Oceanog. exped., Antarctica** (Kort), 8.9–80; **Glac. research, Antarctica** (Sharp), 8.9–91; **Synoptic met. of polar regions,** 8.9–305.

8.9–35 91.04(99)

Béchervaise, John, **Antarctic horizons.** *Weather*, 12(6):187–190, June **1957.** photo. **DWB**—Chatty account of life at Mawson, depot-laying journeys by weasel, ice-flow and crevasses. *Subject Heading:* **1. Antarctic expeditions.**—*C.E.P.B.*

8.9–36 91.04(99)

Lowe, George, **The British Transantarctic Expedition.** *Institute of Navigation, London, Journal,* 10(2):161–167, April **1957.** 6 figs. **DWB**—Previous successful attempts (FILCHNER, SHACKLETON) to cross Antarctica are described and plans of 1957–58 British expedition are set out. "Theron" was frozen in for 30 days before reaching Shackleton base. *Subject Headings:* **1. British Trans-Antarctic Expedition, 1957–1958 2. Antarctica.**—*C.E.P.B.*

8.9–37 551.582(99) 550.3:061.3

Iriart, Luis M., **Antártida: características meteorológicas.** [The Antarctic: meteorological characteristics.] *Sociedad Científica Argentina, Anales,* 162(1/2):36–62, July/Aug. **1956.** 13 figs., table. English summary p. 36. **DLC, DWB**—The general and local circulation and typical synoptic charts and mean features of the Antarctic climate are treated in 2 categories: 1) Antarctic seas and 2) Antarctic continent. Other aspects: temperature, sea ice, freezing line, clouds, humidity, wind, fog, visibility and precipitation (mostly snow), are discussed, with a few charts and brief tables. The IGY program for the Antarctic is discussed and a chart showing location of various bases and country occupying these bases presented along with other charts. *Subject Headings:* **1. Climate of the Antarctic 2. IGY Antarctic stations 3. IGY Antarctic program 4. Antarctica.**—*M.R.*

8.9–38 910.1(99) 551.581(99)

†Kosack, Hans-Peter, **Die Antarktis: eine Länderkunde.** [The Antarctic: a geographical study.] Heidelberg, Keyser, **1955.** 310 p. numerous figs. (incl. maps and photos) 1 fold in pocket. bibliog., p. 245–259. *Geographische Handbücher.* **DLC** (G860.K66)—This treatment of the geography of the Antarctic is based upon the most recent available literature and is not merely a descriptive geography but is also a reference work. With the aid of numerous maps and tables of data, the author discusses the boundaries, subdivisions and nomenclature of the Antarctic, the history of exploration of the Antarctic, the geomorphology and surface forms of the ice free area, climate, terrestrial magnetism and the aurora australis, the Antarctic Ocean, ice of the Antarctic Ocean, flora and fauna, the economy of the South Polar regions, political claims and settlements, acclimatization and prospects of future settlement, the geography of (1) scattered sub-Antarctic islands, (2) of the sub-Antarctic islands of the South Atlantic, (3) the sub-Antarctic islands of South Georgia and the South Sandwich Group, (4) the sub-polar islands of the South Orkneys Group and the southern Shetland Islands, (5) of scattered polar islands and (6) the Western Antarctic and the eastern Antarctic. The appendix contains tables giving the areal dimensions of various regions, a chronological list of all stations in the Antarctic continent and adjoining islands, and a number of photographs. *Subject Headings:* **1. Antarctic geography 2. Antarctic exploration 3. Climate of Antarctic 4. Antarctica.**—*I.L.D.*

8.9–39 550.3:061.3

Gould, Laurence M. (*Pres. Carleton College, Northfield, Minn.*), **Antarctic prospect.** *Geographical Review,* N. Y., 57(1):1–28, Jan. **1957.** 20 figs., 23 refs. **DWB, DLC**—In this survey of Antarctica which is provided with numerous photographs and maps which show the explored and unexplored areas from 1760 to 1955, the author discusses the history of the exploration of Antarctica, the geography and geology, the mineral deposits, the glaciers, the climate of flora and fauna and the scientific program for Antarctica during the IGY. *Subject Headings:* **1. IGY Antarctic program 2. Antarctic exploration 3. Antarctica.**—*I.L.D.*

IGY

See also: **IGY glac. program** (Sharp), 8.9–91.

8.9–40 551.594:550.3:061.3

Israel, H., **Das Internationale Geophysikalische Jahr, VI: Luftelektrizität und Wetter.** [The I.G.Y. Pt. 6: Atmospheric electricity and weather.] *Umschau,* 57(11):337–339, June 1, **1957.** 6 figs., ref. **DLC**—The maintenance of the atmospheric electric field is related to world thunderstorm activity. The field decreases rapidly with height, but the vertical current

is almost constant with height. These facts need to be confirmed in the IGY by climatological and synoptic studies. West Germany's part will be a network of stations in W. Germany and an expedition to San Salvador. *Subject Headings:* **1. Atmospheric electricity 2. German participation in I.G.Y.**—*C.E.P.B.*

8.9–41 550.3:061.3

Troitskaĭa, V. A., **O Mezhdunarodnom geofizicheskom gode.** [International Geophysical Year.] *Akademiia Nauk SSSR, Izvestiĭa, Ser. Geofiz*, No. 4:397–399, July/Aug. **1955. DLC**—The Soviet personnel of the various committees established by the Academy of Science of the U.S.S.R. in 1955 in connection with International Geophysical Year are listed. *Subject Headings:* **1. International Geophysical Year 1957–58 2. Russian participation in IGY.**—*I.L.D.*

WMO, UNESCO

See also: **Radiation conference, Davos** (Wörner), 8.9–53.

8.9–42 551.5(26):061.3

World Meteorological Organization Second Conference of the Commission for Maritime Meteorology. *Meteorological Magazine*, London, 86(1019):152–154, May **1957.** photo. **DWB**—Account of session at Hamburg in Oct. 1956. Recommendations were made to increase number of "auxiliary" ships in areas where shipping is sparse, assistance of shipping in I.G.Y., publication of booklet on "Meteorological care of cargo," and classification of "storm" in Beaufort scale. New international Ice Nomenclature was adopted and some other points considered. *Subject Heading:* **1. WMO. Commission for Maritime Meteorology.**—*C.E.P.B.*

8.9–43 551.45:061.1:341.13

Duisberg, Peter C., **Man against the desert.** *U. S. National Commission for UNESCO, 5th National Conference, Cincinnati, Ohio, Nov. 3–5, 1955, (Documents?)*, 5/WG/10. 18 p. **DWB** (M79 U585u)—Notes on importance of UNESCO's Arid Zone program, first inaugurated in 1948–9, and the functions, mode of operation, membership of advisory committee, program in various fields such as hydrology, meteorology and climatology, geology, soils, etc. Recommendations and a suggestion for an International Centre for Desert Research (by Michael Evanari, Vice President of Hebrew University, Jerusalem) to collect and disseminate information and to organize and coordinate research but not to perform research. The report includes a paper prepared by the UNESCO secretariat as well as the introduction by the author. *Subject Headings:* **1. Arid zone research 2. UNESCO Arid Zone Research Program.**—*M.R.*

SERVICES

See also: **Met. serv., Poland** (Bulavko), 8.9–57; **Agromet. services, U.S.S.R.** (Sinel'shchikov), 8.9–102; **Hydrol. serv., New Zealand** (Schnackenberg), 8.9–270.

8.9–44 551.5:061.3

Copeland, J. A., **Meteorological mission of the Army Electronic Proving Ground.** *American Meteorological Society, Bulletin*, 37(2):70–73, Feb. **1956.** 7 figs. (incl. photos). **DWB, DLC**—The author describes the organization of the meteorological group of the Aviation and Meteorological Dept., Army Electronic Proving Ground at Fort Huachuca, Arizona, its origin and its functions. It consists of an Equipment Division which analyzes the meteorological support required by the Army in its research and development program; the Plans and Programs Div. which reviews the requirements for meteorological services presented by the Army Technical Services, tests and evaluates new methods and prefaces meteorological staff studies; and the Operations Div. which manages the meteorological teams making observations and forecasts where the Army carries on research and development. Graphs showing the locations of Fort Huachuca and of Army Signal Corps Meteorological Teams and photographs illustrating meteorological activities are presented. *Subject Headings:* **1. Meteorological research 2. U. S. Army-Electronic Proving Ground, Fort Huachuca, Arizona.**—*I.L.D.*

8.9–45 551.509.52

Roediger, Geert, **Aus der Praxis des Sturmwarndienstes.** [Experience of the Storm Warning Service.] *Germany. Deutscher Wetterdienst, Mitteilungen,* No. 10:69, Feb. **1955. DWB**—The duties and organization of the service along the German coasts are described. Wind warnings for the coastal navigation are issued for winds of force 6–7 (Beaufort), storm warnings for force 8–10 and hurricane warnings for force 11–12. They are sent out 6–12 hours in advance and are transmitted by telephone or wire to about 30 signal stations along the coast which display proper signals. Since the last war the coast line is divided into 4 areas (8 before the war). The warnings are also transmitted by radio telegraph or telephone in German and English over the North German and Kiel radio networks to ships navigating in the North Sea. It is pointed out that 3-hour pressure tendencies from which expected pressure gradients can be determined are an important means for detecting the storm hazard. The possibility of forecasting sea swell is now being investigated. *Subject Headings:* **1. Storm warning services 2. Storm warnings 3. Germany.**—*A.M.P.*

8.9–46 551.515.2:551.509.312

U. S. Weather Bureau. National Hurricane Research Project, **Bimonthly progress reports,** No. 1–8, Feb. 15, **1956**–April 15, **1957.** About 10 p. each. charts, refs. Mimeog. **DWB**—The 8 routine progress reports contained in this group cover various activities of the National Hurricane Research Project at West Palm Beach, Fla., in Washington, D. C., Suitland, Maryland, and at universities and other agencies contracting with the project. Regular topics are: 1) Data Collection Program (West Indian Rawinsonde Network, Aircraft Observation Program, Storm Surge Data Program, Hurricane Beacon, etc.); 2) Data Processing and Analysis; 3) Research and Development at the various centers including Climatological Services Division and Hydrologic Services Division and Office of Meteorological Research (Long Range and Numerical Forecasting, Washington National Airport, New Orleans, Boston, San Juan). *Subject Headings:* **1. National Hurricane Research Project 2. Hurricane research 3. West Palm Beach, Fla.**—*M.R.*

8.9–47 551.509.5:551.515.2:061.1

Weather Bureau: Congress votes crash program for storm alerts, weather man's modern tools show promise. *Congressional Quarterly News Features, Weekly Report,* July 1, **1955,** p. 759–766. fig., table. **DWB**—A thorough discussion of recent increases in appropriations made by the U. S. Congress for the Weather Bureau for the fiscal year 1956. A long range program of research and improvement of facilities for detecting severe storms and for issuing warnings is intended to save millions of dollars in property damage and losses in life during hurricanes, floods and tornadoes. Wind, hail, and tornado damage (in 1954) and tornado damage, deaths and frequency (1916–54) are listed by states. Rain making investigations and control are also discussed. *Subject Headings:* **1. U. S. Weather Bureau appropriations 2. Hurricane warning services 3. Tornado damage 4. Artificial precipitation.**—*M.R.*

OBSERVATORIES AND INSTITUTIONS

See also: **Met. at Krakow Univ.** (Dubinskiĭ), 8.9–55.

8.9–48 551.501.9:551.43(433)

Grunow, J.; Grege, H. and Heigel, K., **Das Observatorium Hohenpeissenberg 1781–1955.** [Hohenpeissenberg Observatory, 1781–1955.] *Germany. Deutscher Wetterdienst, Berichte,* 5(36):**1957.** 46 p. 3 figs., 13 tables, 45 refs. **DLC**—In an introduction H. Flohn points out that the 175-year series on an isolated peak is unique. Grunow (p. 4–11) summarizes the state of meteorology and the history of the observatory, with a bibliography. Grebe (p. 12–39) summarizes the temperature observations, with careful comparisons of the window screen used until 1936 and the Stevenson screen subsequently, and interpolation of missing observations. Annual and decadal means for each month are given for air temperature, and comparisons made with other stations. Extremes for each day are tabulated. Heigel (p. 40–46) discusses the phenological observations for 1781–89 and 1792 and compares them

with 1950–55. *Subject Headings:* **1. Mountain observatories 2. Hohenpeissenberg, Bavaria.** —*C.E.P.B.*

8.9–49 551.501.9(744)

Kuettner, Joachim, **Memorandum on the status of the Mount Washington Observatory.** *Mount Washington Observatory, Gorham, N. H., News Bulletin,* No. 29:6–9, April **1956.** 4 photos., table. **DWB**—Recommendations are made regarding increased compensation for observers on Mt. Washington, improvement of quarters and study facilities, modernization of instrumental equipment and recorders, installation of a tower platform to allow free flow of air over instruments, specifications for such a platform, and costs. *Subject Headings:* **1. Mount Washington Observatory 2. Meteorological observers salaries 3. Mt. Washington, N. H.**—*M.R.*

8.9–50 523.7

McMath, Robert R. (*McMath-Hulbert Obs., Michigan Univ.*), **Solar research at the McMath-Hulbert Observatory.** *Astronomical Society of the Pacific, San Francisco, Publications,* 64(379):151–164, Aug. **1952.** table, plates, 2 figs. **DLC**—The organizational set-up at the observatory is described with particular emphasis upon its efficiency in co-ordinating the work of investigators in the different fields of solar research. Recent progress made in installations, instrumentation and research is summed up. Photographs of flares and prominences are presented. *Subject Headings:* **1. Solar research 2. McMath-Hulbert Observatory.**—*G.T.*

CONFERENCES

See also: **Second conf. of WMO Commission for Maritime Met.,** 8.9–42; **Conf. on wind regime in U.S.S.R.** (Anapol'skaia), 8.9–214; **Conf. on stellar scintillation** (Iudalevich), 8.9–311.

8.9–51 551.58:061.3

Senkowski, H., **Konferencja klimatologiczna.** [Climatological conference.] *Przegląd Meteorologiczny i Hydrologiczny,* Warsaw, 7(3/4):195–197, **1954. DLC, DWB**—This is a report on the proceedings at the All-Polish Climatological Conference called together at Wrocław on 26–27 March 1954 by the Dept. of Geography of the Polish Academy of Sciences, and attended by a number of well-known Polish geographers, climatologists and meteorologists. The purpose of the conference was to establish the present state of Polish climatology and to discuss the tasks facing it in the near future. These aims have been achieved, on the whole, although the discussions did not definitely solve the problem of the relationship between climatology and meteorology. *Subject Headings:* **1. Climatological conferences 2. Poland.** —*A.M.P.*

8.9–52 061.3:551.57 061.3:551.594.21

Vul'fson, N. I. and Levin, L. M., **Piataia mezhduvedomstvennaia konferentsiia po voprosam issledovaniia oblakov, osadkov i grozovogo elektrichestva.** [Fifth interdepartmental conference on cloud, precipitation and thunderstorm electricity research.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz.,* No. 6:735–739, June **1956. DLC**—This conference was held during Feb. 6–11, 1956 at the Central Geophysical Observatory. Some sixty reports were presented on work carried out during the first three years. Brief summaries are given of about thirty of the papers that were presented. *Subject Headings:* **1. Conferences 2. Cloud 3. Thunderstorm electricity.**—*I.L.D.*

8.9–53 551.521:061.3

Worner, H., **Internationale Strahlungskonferenz in Davos.** [International radiation conference in Davos.] *Zeitschrift für Meteorologie,* 10(11):346–347, Nov. **1956. DLC**—Account of meeting on 10–15 Sept. 1956 of conference called by the Radiation Commission of the International Association of Meteorology and Radiation Working Group of WMO. Eight recommendations and a resolution are listed. *Subject Heading:* **1. Radiation conferences.** —*C.E.P.B.*

EDUCATION, HISTORY AND BIOGRAPHY

EDUCATION

See also: **Teaching of climatology** (Futó), 8.9–277.

8.9–54 551.5:37

France. Service de la Météorologie Nationale. **L'Ecole de la Météorologie.** [School of Meteorology.] Paris, 1953. 92 p. DLC QC857.F7A52.—The organization, rules for admission, prerequisite courses, and program of training provided by the Official School for Meteorology conducted by the French Met. Service under Act of July 19, 1948, for the training of 4 classes of meteorologists or technicians working in meteorology, are outlined in full detail in this catalog. *Subject Headings:* 1. **Meteorological education** 2. **France.** I. **Paris. École de la Météorologie.**—*M.R.*

8.9–55 551.5:061.3

Dubinskiĭ, G. P., **Meteorologiia v Khar'kovskom universitete. (K 150-letiiu universiteta).** [Meteorology at the Kharkov University: 150th anniversary of the University.] *Meteorologiia i Gidrologiia*, Leningrad, No. 5:53–54, March 1956. DWB, DLC—The founder of the University of Kharkov, V. N. Karazin, was interested in meteorology and advocated the establishment of a central meteorological network. Meteorological observations were begun at the University in 1839. Instructions and research during the 19th and 20th century are discussed and the names of the outstanding meteorologists associated with the University and their achievements are mentioned. *Subject Headings:* 1. **University of Kharkov, U.S.S.R.** 2. **Meteorological research.**—*I.L.D.*

8.9–56 551.5:37

Kraus, Eric B., **The place of meteorology in liberal education.** *Weather*, London, 12(6): 171–182, June 1957. DWB—This is the first prize winner in the Weather Essay competition. It begins with a historical survey of the concept of a liberal education, which in the 20th Century came to include science. Meteorology is well suited for an example of applied science. Modern meteorology is defined; in our technological age the elements in it are still growing but its problems do not exist in isolation; meteorology links different branches of physical science. A "liberal" course in meteorology is laid down. The author then turns to meteorology as an occupation for leisure, especially in connection with sailing, gliding, mountaineering, or even the study of literature or painting. *Subject Heading:* 1. **Education in meteorology.**—*C.E.P.B.*

HISTORY

See also: **Man and the elements** (Marshak), 8.9–11; **Ocean river** (Chapin, Smith), 8.9–12; **Met. at Krakow Univ.** (Dubinskiĭ), 8.9–55; **Hist. of physics** (Roller, Roller), 8.9–66.

8.9–57 551.5:061(09)(438)

Bulavko, A. G., **Razvitie meteorologii v Narodnoĭ Pol'she.** [Development of meteorology in Poland.] *Meteorologiia i Gidrologiia*, No. 4:58–62, April 1956. DWB, DLC—This account of the development of meteorology in Poland since 1945 is concerned with the government hydrometeorological service, meteorology in higher educational institutions, the Polish meteorological and hydrological society and foreign relations of Polish meteorologists. The nature of the practical work and the research carried on are described. *Subject Headings:* 1. **History of meteorological organizations** 2. **Poland.**—*I.L.D.*

8.9–58 551.5(09)

Sun, Yeh-Chi (*Chinese Peoples Republic*). **Kratkiĭ obzor razvitiia geograficheskoĭ nauki v Kitae.** [Brief review of development of geographical science in China.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geog.*, No. 5:61–67, Sept.-Oct. 1955. DLC—The author mentions early Chinese writers on climate, hydrology and phenology during the first, sixth and seventeenth centuries of our era and various meteorological and climatic studies during the nineteenth and twentieth centuries up until the establishment of the Chinese People's Republic in 1949 and

mentions briefly, activity in climatology on mainland of China. *Subject Headings:* **1. History of meteorology 2. China.**—*I.L.D.*

8.9–59 551.524.37:8:612.78

Wilson, Edward M. and Rickard, P., **Frozen words.** *Polar Record*, Cambridge, 8(53):95–108, May 1956. fig., 15 refs. **DLC**—The humorous idea that words can freeze as soon as uttered, and only become audible on thawing, is traced back to Antiphanes, and reappeared in 1508. The complementary idea, that India is so hot that words melt, also appeared in the 16th century. Frozen words frequently recurred, mostly in parable, with increasing verisimilitude in tales of the North Pole and Siberia in the 17th and 18th century, ending with the famous story of Baron Munchausen's frozen post-horn. *Subject Headings:* **1. Frost effects 2. Fables.**—*C.E.P.B.*

BIBLIOGRAPHY AND TERMINOLOGY

See also: **Dictionary of met.** (Brazol), 8.9–16; **Radiation bibliography** (Godson), 8.9–185; **Wind terminology** (Frleta), 8.9–223.

8.9–60 551.5(98):016(048.8)

†Arctic Institute of North America, **Arctic Bibliography, Vol. 7.** Prepared for and in cooperation with the Dept. of Defense under the Direction of the Arctic Institute of North America. Ed. by Marie Tremaine. Wash., D. C., U. S. Govt. Print. Office, **1956.** 1071 p. map (fold.) 5054 items (No. 38411–43464). Price: $4.25. **DLC**—This 7th volume of the **Arctic Bibliography** consists of references to over 5000 scientific publications in the fields of medicine, biology, geology, geography, engineering, navigation, meteorology, climatology, fisheries, etc. Of these, 1184 are from Russian sources, 298 from German, 223 Danish, 188 French and 277 from 13 other languages. Over 75% were from publications dating since 1950. Cooperation was received from England, Norway, France and elsewhere. Over 270 expeditions were reported. The entire collection is indexed and cross-indexed by subject, geographic area and subdivisions thereof. The number of items of interest to meteorologists runs into the hundreds. *Subject Headings:* **1. Arctic bibliographies 2. Arctic meteorology. I. Tremaine, Marie** (*ed.*) **II. U. S. Dept. of Defense.**—*M.R.*

8.9–61 551.58:016

†U. S. Weather Bureau, **List of unclassified and restricted meteorological literature prepared by the U. S. Weather Bureau during the years 1940 through 1944.** U. S. Weather Bureau, Jan. 1, **1945.** 36 p. Carbon of typescript. **DWB** (MO16.U587La)—A list of several hundred climatic studies—mostly regional or local and many merely compilations of climatic data available in the Statistics Div. of the U. S. W. B. at the time of publication. Most of the studies were made during the War for the U. S. Army Air Weather Service, and were heavily weighted in respect to conditions for flying or air base construction and maintenance. Several of the studies are comprehensive climatologies of the regions involved—ranging from the Arctic and the Aleutians to S.W. Asia or South America, and prepared under the direct supervision of C. E. Lamoureux with technical advice from W. C. Jacobs. A number were prepared by other research activities of the U. S. W. B. at Washington. *Subject Headings:* **1. Bibliographies on climatology 2. Military meteorology reports.**—*M.R.*

8.9–62 551.311.17:001.4

Armstrong, Terence and Roberts, Brian, **Illustrated ice glossary.** *Polar Record*, 8(52): 4–12, Jan. **1956.** 40 photos. **DLC**—This provisional glossary for the use of mariners includes 68 definitions, mostly with photographs, and a classified summary. *Subject Heading:* **1. Ice glossary.**—*C.E.P.B.*

8.9–63 551.511:001.4

Fulks, Joe R. (*U. S. W. B., Wash., D. C.*), **"Diabatic" for "non-adiabatic."** *American Meteorological Society, Bulletin*, 35(8):380, Oct. **1954.** ref. **DWB**—The author calls attention to the use of the word *diabatic* in place of *non-adiabatic* by B. L. Hicks and D. J. Montgomery (Hicks, Bruce L., **Diabatic flow on a compressible fluid** in *Journal of Applied Mathematics*,

6(3):221–237, Oct. 1948). *Subject Headings:* **1. Terminology 2. Diabetic 3. Nonadiabatic.** —*I.L.D.*

8.9–64 001.4:551.46

Hall, G. P. D., **A plea for oceanology.** *Deep-Sea Research*, London, 2(2):160, Jan. **1955.** Also: his article, same title, *Ibid.*, 2(4):285–286, July **1955. DWB.** Also: Carruthers, J. N. (National Inst. of Oceanog., Eng.), article of same title, *Ibid.*, 2(3):247, April **1955. DWB**—The author suggests use of "oceanology" for the broad science or study of the oceans, confining oceanography to the description of oceans by analogy to the use of geology and geography, hydrology and hydrography and even biology and biography. In the second article, CARRUTHERS objects to the attempt by HALL to "flog a dead horse" by straining a point of logic and flying in the face of long established usage. He cites objections even to the arguments about the analogous disciplines referred to by HALL. Finally, HALL concludes the argument by denouncing CARRUTHERS' attempt to defend incorrect terminology on the grounds of custom and long usage. He says biography is a branch of biology (the science of life), hydrography the charting and descriptive aspect of hydrology, and geography the mapping and descriptive branch of geology. *Subject Headings:* **1. Oceanology 2. Terminology.**—*M.R.*

BIOGRAPHY

8.9–65 551.5:92

Réthly, Antal, **Conrad professzor 80 éves.** [Professor Conrad, octogenarian.] *Időjárás*, Budapest, 60(4):248–249, July/Aug. **1956. DLC**—Victor Conrad is one of the most outstanding representatives of the Viennese school of meteorologists created by HANN. Since 1901 he has been active both in climatology and in seismology, first in Austria and since 1940 at Harvard University. His outstanding work is **Methods in Climatology** (1944 and 1950). *Subject Headings:* **1. Biography 2. Conrad, Victor.**—*G.T.*

8.9–66 537.2(09)

Roller, Duane and Roller, Duane H. D., **Francis Hauksbee.** *Scientific American*, 189(2): 64–69, Aug. **1953.** 4 figs., illus. **DWB**—An interesting historical article on the original experiments made by Francis Hauksbee and reported in the **Philosophical Transactions** of the Royal Society in the first decade of the 18th century. These experiments dealt with the electrical discharge which produced luminescence in the vacuum portion of the mercurial barometer when disturbed or rubbed. This led to discoveries regarding charges in tubes with varying degrees of vacuum when rubbed or in vicinity of charges. In 1704 he published a paper on the cause of the descent of mercury in a barometer during a storm. He invented a number of clever instruments or apparatuses and laid the groundwork for discoveries of + charges, dynamo effects, etc. *Subject Headings:* **1. Barometric light (luminescence) 2. Electrostatics 3. History of physics. I. Hauksbee, Francis.**—*M.R.*

8.9–67 551.5:92 551.509.5:551.515.2

Kobler, John, **Big wind man: Grady Norton, expert on hurricanes. . . .** *Life*, New York, 25(14):111–114, Oct. 4, **1948.** illus., port. **DWB**—Brief life history of Grady Norton, Supervising Forecaster with the Hurricane Warning Service, Miami, Fla. Activities of the Service are described in conjunction with "Hurricane Oxcart," which occurred in Sept. 1948. Norton's contribution to the theory of hurricanes is pointed out; his rather sceptical views on the possibility of hurricane prevention by bombing and dry ice seeding are mentioned; his portrait is presented. *Subject Headings:* **1. Norton, Grady 2. Biography 3. Hurricane warning services.**—*G.T.*

PRACTICAL AND APPLIED METEOROLOGY

ASTRONAUTICS—SATELLITE OBSERVATORIES

8.9–68 551.507.36:629.19:551.524.7

Gast, P. R. (*U. S. A. F., Cambridge Res. Center*), Insolation of the upper atmosphere and of a satellite. (In: Van Allen, James A., ed., **Scientific uses of earth satellites.** Ann Arbor,

Univ. of Michigan Press, **1956.** p. 73–84. 4 figs., 4 tables.) **DWB, DLC**—Three factors determine satellite temperature: 1) direct solar radiation, 2) returned solar radiation (both at 6000°K) and 3) long wave (250°K) radiation from earth. Ranges of maximum and minimum temperature at various distances from earth and in sun and shadow are calculated for proposed trajectories. Difficulties involved in measurements of temperature and albedo are mentioned. Range for 300–1000 mile orbit are from 13°C to −3°C for 3 possible cases. *Subject Headings:* **1. Satellite temperatures 2. Satellite temperature calculations.**—*M.R.*

8.9–69 551.507.36:629.19

Kallmann, H. K. and Kellogg, W. W., **Use of an artificial satellite in upper air research.** *American Meteorological Society, Bulletin,* 38(1, pt. 1):17–19, Jan. **1957.** fig. **DWB, DLC.** Also in *Rand Corporation, Santa Monica, Calif., Papers,* P-760, Feb. 15, **1956.** 9 p. 2 figs. **DWB**—The meteorological problems which could be solved by satellite observations of cosmic ray primaries and secondaries, micrometeorites, meteorites, ultraviolet intensities, x-ray radiation, solar variations, solar constant, albedo, magnetic field, size and shape of the earth, etc. are discussed. Seeding with known gases to help track the satellite and to determine composition of high atmosphere, artificial meteors sprayed from the satellite, electron density determinations, temperature and density measurements, etc. are also discussed. *Subject Headings:* **1. Satellite uses 2. Satellite observatories 3. Upper air research.**—*M.R.*

8.9–70 551.507.36:551.510.3 551.507.36:551.547

Sicinski, H. S.; Spencer, N. W. and Boggess, R. L. (*all, Engineer. Res. Inst., Univ. of Michigan, Ann Arbor*), **Pressure and density measurements through partial pressures of atmospheric components at minimum satellite altitudes.** (In: Van Allen, James A., ed., **Scientific uses of earth satellites.** Ann Arbor, Univ. of Michigan Press, **1956.** p. 109–119, 5 figs., 12 refs., 14 eqs.) **DWB, DLC.** Also in: Michigan. Univ. Engineering Research Institute, Contract AF 19(604)-545, Report CS-5, March 1956.—Pressures in 400–900 km ranges are expected to be 10^{-10} to 10^{-8} mm, and densities 10^{6} to 10^{8} particles/cm^{3}. Ionization chambers would not be useful in this range but modified "omegatrons" or "synchrometers" would be sensitive at 10^{-10} mm pressure. Equipment operates like a cyclotron: ions are accelerated by the alternating field. Article specifies environment, theory of operation of "synchrometer." Resolution, data output, satellite instrumentation, ionized and unionized environment and tuned gages are outlined. *Subject Headings:* **1. Satellite pressure measurements 2. Satellite density measurements 3. Synchrometers.**—*M.R.*

8.9–71 551.507.362

A scientific race against time to launch the first man-made moon. *Life,* Chicago, 42(22): 42–52, June 3, **1957.** photos. **DLC**—Many large, detailed, colored photographs of the satellite developed at the U. S. Naval Research Laboratory, some of the people involved in the development, testing techniques, giant computers to help track the satellite, and a model of the rocket (3-stage), the launching trajectory, and future moon-circling rockets are presented in this unusual popular article on Project Vanguard. The cover of the issue also contains a large photograph of the satellite. *Subject Headings:* **1. Satellite observatories 2. Project Vanguard.**—*M.R.*

AERONAUTICAL METEOROLOGY

See also: **Condensation trails,** 8.9–252; **Precip. atmos. models** (Atlas, Kessler), 8.9–256; **Visibility from airplanes** (Weiss), 8.9–309.

8.9–72 551.501.4:551.556:629.13

*British Commonwealth Pacific Airlines Ltd., Sydney, Australia, **Mean equivalent winds along track experienced by B.C.P.A. aircraft at cruising altitudes.** Mimeographed. 4 sheets of explanation. 25 tables, Jan. 1952–March **1954.** 1 table, Oct. 1949–Sept. **1953. DWB** (M57.3 B862m)—Monthly tabulations of mean equivalent winds at cruising heights (10–13 and 16–19 thousand feet) during Oct. 1949–Sept. 1953, for numerous routes between Sydney,

Nandi, Auckland, Canton Islands, Honolulu and San Francisco. The statistics are based on pilot reports for 4511 of 5060 flights made with DC-6 airplanes during the period. Not many flights before Oct. 1952 are included. The equivalent wind is that wind, which if blowing parallel to track at a steady velocity from the first reliable position after reaching top of climb, would account for the difference between air and ground speed as determined at the last reliable fix before descending at destination. A memo attached indicates reports are in error by 4 to 7 knots, i.e., give too great tail or too small head winds by 4 to 7 knots. *Subject Headings:* **1. Equivalent winds over Pacific 2. Aeronautical meteorology 3. Pilot wind reports 4. Upper air records 5. South Pacific.**—*M.R.*

8.9–73 551.551:551.557:629.13

†International Civil Aviation Organization, **Atmospheric turbulence in relation to air navigation.** Its *ICAO Circular*, 44-AN/39, **1955.** 39 p. figs., table, 24 refs., eqs. **DWB**—Several aspects of turbulence at flying altitudes are considered. The observing, recording, reporting, analyzing and forecasting of both turbulence in clouds and clear air turbulence are discussed on the basis of ICAO and WMO studies and recommendations. Past literature is reviewed and considerations for improvement in theoretical knowledge and in reporting and interpreting reports are explored. It will be a long time before theoretical advances can be incorporated into forecast techniques, hence the use of actual observed turbulence data in relation to synoptic patterns seems the only hope for improvement of forecasting in the next few years. Studies of the portion of the spectrum of turbulence which result in bumpiness to airplanes are needed. *Subject Headings:* **1. Atmospheric turbulence 2. Bumpiness 3. Aerial navigation.**—*M.R.*

8.9–74 551.584.6:629.135.1:646

Kuettner, Joachim, **Report on high altitude tests with Navy Arctic suit.** *Mount Washington Observatory, Gorham, N. H., News Bulletin*, No. 29:4, April **1956. DWB, DLC**—During glider flights in connection with the Sierra Wave Project to 40,000-43,000 ft over the Sierra Nevadas, the author experienced cabin temperatures ranging from 96°F at the ground to −45°F during descent, and at the floor (where feet rest) possibly 10°F colder. This range of 80°C or 140°F results in extreme discomfort due to sweating on ascent and freezing on descent. Some relief was found to result from use of the Navy Arctic Suit which could be unzipped at first and then zipped up at low temperatures. The shoe problem is still not solved. Clothing must not be bulky and must have plenty of pockets. *Subject Headings:* **1. Glider cabin temperatures 2. Glider micrometeorology 3. Clothing for glider pilots 4. Sierra Wave Project.**—*M.R.*

8.9–75 551.501.4:551.553.6:656.71

Wadsworth, J., **Wind summaries and airfield usability.** *Meteorological Magazine*, London, 85(1007):129-133, May **1956.** fig., 3 tables, 3 refs., eq. **DWB**—Estimates of unusability of a runway through cross winds can be obtained from a simple wind rose table by an unpublished equation derived by L. Jacobs: $\log_e n_e = a - bv^2$, where n is frequency of winds exceeding speed v and a and b are constants for wind direction and station. A method of applying this is given with tables. Computed and observed values by direction and force are compared for Guernsey and Skeabrae. *Subject Headings:* **1. Airport climatology 2. Wind frequency calculation.**—*C.E.P.B.*

8.9–76 551.594.221:551.524

Wegener, Kurt (*Graz*), **Über den Ursprung der Blitze.** [Origin of lightning.] *Wetter und Leben*, Vienna, 7(3/4):75–77, **1955.** table. **DLC**—Analysis of U. S. statistics (presented in a table) on the relationship between atmospheric temperature and lightning strokes on airplanes indicates that 0°C is the air temperature at which airplanes are most often hit by lightning. The origin of lightning is to be sought during the transformation of water into ice and ice into water which occurs at 0°C when electric or electronic resonance occurs. *Subject Headings:* **1. Lightning strokes on airplanes 2. Temperature-lightning relationships.**—*I.L.D.*

MARINE METEOROLOGY AND OCEANOGRAPHY

See also: **Air masses and fronts** (Bleeker, Van Duijnen Montijn), 8.9–3; **Oceanog., Norwegian coast** (Sverdrup), 8.9–7; **Wind waves at sea** (Titov), 8.9–8; **Intro. to oceanog.** (Visser), 8.9–9; **Ocean river** (Chapin, Smith), 8.9–12; **Marine Climatic Atlas, N. Pacific** (U. S. Off. of Naval Operations), 8.9–13; **Storm situations, Iceland region** (Mertins), 8.9–30; **Marine met. conference,** 8.9–42; **Storm warning serv., Germany** (Roediger), 8.9–45; **Plea for "oceanology"** (Hall), 8.9–64; **Vertical gradient measurements made at sea** (Espersen et al), 8.9–93; **Storm surge, N. Sea** (Feb. 1955) (Lundbak), 8.9–176; **Winds and water level, Swedish coast** (Bergsten), 8.9–228; **Wave motion** (Rivière, Vernhet), 8.9–229; **Wind driven currents** (Fel'zenbaum), 8.9–232.

8.9–77 551.463

Bullard, E. C. (*Univ. of Camb., Eng.*); Maxwell, A. E. and Revelle, R. (*Scripps Inst. of Oceanog., Univ. of Calif., LaJolla*), **Heat flow through the deep sea floor.** *Advances in Geophysics*, Ed. by H. E. Landsberg, 3:153–181, **1957.** 6 figs., 4 tables, 44 refs., 8 eqs. **DWB, DLC**—Systematic review of methods of measuring heat flow and temperature gradients and thermal conductivity, in the deep portions of the Atlantic and Pacific and their bottoms. Possible sources of heat (e.g., radioactivity), convection, etc. are discussed and illustrated with diagrams and charts. *Subject Headings:* **1. Heat flow across ocean bottom 2. Oceanographic sounding 3. Radioactivity in ocean bottom.**—*M.R.*

8.9–78 629.12.055:551.575

Colbeck, W. R.; Le Page, L. S. and Hansford, R. F., **Port operation in fog, Pt. 1, Liverpool port radar. Pt. 2, The nature of the problem. Pt. 3, Some electronic solutions.** *Institute of Navigation, London, Journal*, 10(2):138–141; 141–147; 147–151, April **1957.** 9 figs., 3 refs. Discussion p. 151–155. **DWB**—Colbeck said that the Port Radar Station was opened in 1948 and v.h.f. ship to shore communication in 1950. A new station was opened Nov. 30, 1956. Examples of savings are quoted. Le Page discussed critical visibility, economic loss due to delay, desirability of preventing blocks, and instrumentation. F. R. Hansford spoke on recent improvements in instruments. A good discussion followed. *Subject Headings:* **1. Fog protection of shipping 2. Liverpool, Eng.**—*C.E.P.B.*

8.9–79 551.524.3:551.526.6:551.507.22(261)

*Hay, R. F. M., **Some aspects of variations of air and sea surface temperature in short periods at ocean weather stations I and J of significance to the synoptic climatologist.** *Great Britain. Meteorological Research Committee, M.R.P.*, 949, 14 Feb. **1956.** 21 p., 4 figs., 10 tables, 12 refs. **DWB**—Five-day means for 1948–51 at Ocean Weather Stations I (60–59°N, 20–19°W) and J (53°50′–52°30′N, 18°40′–20°W) were compiled, winds being represented by vector components. Air and sea temperatures are plotted for 1948 and 1949; sea almost always exceeded air, especially in winter and low pressure. Wind direction had little effect. Autocorrelations of daily values with lags of 1–7 days are positive at first but negative after 3–6 days. Correlation is also computed between daily anomalies of air and sea temperature. Change of sea temperature showed little relation to surface advection of sea water. Computed energy exchanges between sea and atmosphere mostly showed a large net loss of heat from the ocean. Agreement with actual changes was better in summer than in winter. Advection of heat by ocean currents is examined for a few occasions. The depth of the surface isothermal layer limits the transgression of 1000–500 mb surface isolines. *Subject Headings:* **1. Air-sea temperature variations 2. Ocean weather stations 3. North Atlantic.**—*C.E.P.B.*

8.9–80 551.46:91.04(99)

Kort, V. G., **Okeanograficheskie issledovaniia v Antarktike.** [Oceanographic investigations in the Antarctic.] *Akademiia Nauk SSSR, Vestnik*, 26(6):82–88, June **1956. DLC**—A brief account is given of the various oceanographic expeditions to the Antarctic since 1840, special attention being given to the work and results obtained by the "Ob" during the expeditions of 1956 carried out by the All Union Academy of Sciences. The author discusses the route of the vessel in the Antarctic, the observations on ice and iceberg formation, hydrographic,

geological and plankton observations, etc. *Subject Headings:* **1. Oceanographic expeditions 2. Antarctica.**—*I.L.D.*

8.9–81 551.465(263)

Leip, Hans. **Der grosse Fluss im Meer: Roman des Golfstroms.** [The great river in the sea: romance of the Gulf Stream.] Munich, Paul List Verlag, **1954.** 403 p. illus. (inc. photos). **DLC**—Review by H. Taubert in *Petermanns Geographische Mitteilungen.* Gotha, 100(4):303, **1956.** A long, literary-style account of the discovery, exploration, nature and incidental events connected with the Gulf Stream and its neighboring ocean or land areas, from the beginning of recorded history (or even before) to the present day weather ships and Gulf Stream surveys from Woods Hole or Bermuda. Considerable space is given to the work of MAURY in charting the ocean currents, ROSSBY on the theory of the Gulf Stream and the Jet Stream, and other investigations of STOMMEL, VON ARX, WÜST and SVERDRUP. *Subject Headings:* **1. Gulf Stream surveys 2. Gülf Stream literature.**—*M.R.*

8.9–82 539.16:551.46

Revelle, R.; Folsom, T. R.; Goldberg, E. D. and Isaacs, J. D., (*all Scripps Inst., La Jolla*), **Nuclear science and oceanography.** (In: **International Conference on the Peaceful Uses of Atomic Energy, [Proceedings],** A/CONF. 8/P/277, USA, June 30, **1955.** 22 p. 5 photos, tables, 32 refs., eqs.) **DWB**—A survey of the natural radioactive concentrations in sea water (K^{40}, Rb^{87}, U^{238}, U^{235}, Th^{232}, Ra^{226}, C^{14} and H^3), the total amount in the oceans, etc. and notes on the use of isotopes as tracers of sea currents, diffusion, composition of sea water and marine organisms, interactions between sea and atmosphere, plus a description and illustration of several instruments useful in surveys of radioactivity of the sea and comments on the problem of disposal of radioactive wastes in the sea and how it would affect the concentrations in the ocean as a whole, in stratified layers of the ocean and in marine organisms or portions thereof. *Subject Headings:* **1. Radioactive composition of oceans 2. Radioactive tracers in oceanography 3. Radioactive waste disposal.**—*M.R.*

8.9–83 551.583.14:551.526.6(265/6)

Rodewald, Martin, **Beiträge zur Klimaschwankung im Meere, 7. Beitrag, Die Wassertemperaturen und ihre Anomalien bei den japanischen und nordamerikanischen Wetterschiffen im Nordpazifischen Ozean.** [Contributions to marine climatic oscillations, Pt. 7, Water temperatures and their anomalies at the Japanese and North American Weather Ships in the North Pacific.] *Deutsche Hydrographische Zeitschrift,* 9(6):289–298, **1956.** 2 figs., 9 tables, 5 refs. German, English and French summaries p. 289–290. **DWB**—Sea temperature at O.W.S. "Extra" (39°N, 153°E) 1948–1953 averaged 1.3°C higher than normals read off N. American atlas (1948). "Tango" (29°N, 135°E) 1951–53 and N. American ships N, V and S averaged 0.4°C above normal. Annual variation of sea temperature and air-sea is discussed. California coastal waters and Alaska Gulf have been below normal. Thus surface temperatures of N. Atlantic and N. Pacific show a parallel warming by about 0.5°C. *Subject Headings:* **1. Sea temperature variations 2. North Pacific.**—*C.E.P.B.*

8.9–84 551.526.6

*U. S. Coast and Geodetic Survey, **Surface water temperatures at tide stations, Atlantic Coast, North and South America.** 5th ed. (with data through 1954). Its *Special Publication,* No. 278, **1955.** 69 p. entirely tables. **DWB** (M26.6 U582sa), **DLC**—(*See* 5.4-143, April 1954, *MAB, for 1951 ed.*) Monthly mean and annual mean and extreme sea surface (bucket) temperatures for 97 stations along the Atlantic and Gulf Coasts; the Caribbean and South American coast from Panama to S. Brazil for entire period of record through 1954 are presented on p. 6–58 (Table I). Table II gives sea water temperatures from recording thermometers for Bar Harbor, Boston, Battery (N. Y.), Atlantic City, Wash., D. C., Daytona Beach and Canova Beach, Fla. including maximum, maximum day, mean, minimum day and minimum for each month of each year of record (1946–54) and on p. 65–68 curves of mean monthly temperature of sea at 66 stations. *Subject Headings:* **1. Sea surface temperature data 2. North American Atlantic Coast 3. South American Atlantic Coast 4. Gulf of Mexico Coast 5. Caribbean Coast.**—*M.R.*

8.9–85 581.54:551.46

†Tarasov, N. I., **Svechenie moria.** [Phosphorescence in the sea.] Moscow, Akademiia Nauk SSSR, **1956.** 202 p. 3 figs., tables, bibliog. p. 185–(203). At head of title: Akademiia Nauk SSSR. Institut Okeanologii. **DLC** (GC181.T3)—The first complete monographic survey of every aspect of marine phosphorescence since 1834, with about 500 references—half from Russian and half from Western literature sources, extending over period from 1819–1954. The 9 chapters cover: 1) marine phosphorescence as a biohydro-optical phenomenon; 2) practical aspects (wartime, etc.); 3) general character; 4) optical aspects; 5) relation to water movements; 6) observational methods; 7) geographic distribution; 8) nature of luminescent marine organisms; and 9) luminescence. The chapter (5) on luminescence as indication of water movements (vertical, horizontal and level) is of interest to meteorologists working with the wind current problem. Ch. 7 also gives interesting data on world-wide frequency of the phenomenon with a chart showing number of cases reported for each 10°sq. *Subject Headings:* **Phosphorescence 2. Oceanographic optics 3. Ocean current indicators.** —*M.R.*

8.9–86 551.465.018(02)

Zubov, Nikolaĭ Nikolaevich and Mamaev, Oleg I., **Dinamicheskiĭ metod vychisleniia elementov morskikh techeniĭ.** [Dynamic method of calculating elements of ocean currents.] Leningrad, Gidrometeorologicheskoe Izd-vo, **1956.** 114 p. 32 figs., 19+7 tables, 43 refs., 66 eqs. **DLC** (GC235.Z8)—A complete revision of ZUBOV's 1935 work on **Dynamic methods of working up oceanographic observations.** The method stems from V. BJERKNES (1910) and from HELLAND-HANSEN and SANDSTRÖM (1903). Pt. I cover the theory of the relations between geometric, baric and dynamic measurements; density, isosters, isobars. Pt. II covers calculation of values from soundings, forms, cross sections, calculation of currents from tables and from graphs respectively, calculations of dynamic depth and height, relation between dynamic heights and current, examples, time-smoothing of observations. Pt. III covers dynamic topography and construction of dynamic charts. *Subject Headings:* **1. Ocean current calculations 2. Dynamic oceanography textbooks. I. Bjerknes, V. II. Helland-Hansen, B.**—*M.R.*

ICE AND GLACIOLOGY

See also: **Climate, Greenland Ice Cap** (Georgi), 8.9–33; **Ice glossary** (Armstrong, Roberts), 8.9–62; **Grinnell Glacier studies** (Dightman), 8.9–292; **Antiglacialism** (Markov), 8.9–293; **Electrification of ice** (Reynolds et al.), 8.9–322.

8.9–87 368.23:551.311.181

Armstrong, Terence, **Insurance against ice risks at sea.** *Polar Record*, 8(56):421–428, May **1957.** fig., table. **DLC** –Normal insurance is not valid in certain waters defined by the Institute of London Underwriters in **Institute Warranties.** Rates for Hudson Bay, opening and closing dates are quoted. Type of ship and other considerations are discussed, including schedule of strengthening for navigation in ice. *Subject Headings:* **1. Insurance 2. Sea ice.** —*C.E.P.B.*

8.9–88 551.311.18(268.2)

Mertins, H. O., **Die Eisverhältnisse in der Dänemarkstrasse im April 1957.** [Ice conditions in Denmark Strait April 1957.] *Wetterlotse*, No. 117:105–112, May **1957.** 4 figs. **DLC**—The "Anton Dohrn" was in E. Greenland Current on April 2–9 and 13–17; ice limits are plotted, ice conditions, weather, air and sea temperatures described. Movements of ice are related to currents and winds; 5-day pressure charts are given for April 1–5, 6–10 and 11–15. With light winds, especially from W to N, there is a tendency for the pack to spread S and SE; S–E winds drive it back to N and W. *Subject Headings:* **1. Sea ice 2. Denmark Strait, Greenland.**—*C.E.P.B.*

8.9–89 551.509.58:551.311.1

†U. S. Hydrographic Office, **Report of ice operations, Labrador Sea, Baffin Bay, and the Canadian Arctic, Summer 1952.** Its *H.O. Misc.*, 15721–52, **1953.** 67 p. 22 figs. (photos), 21 plates (some fold.), 41 refs. Also its: **Report of ice observations and forecasting for the**

season 1953 [2nd annual report]. Its *H.O. Misc.* 15869, 1953, pub. **1954.** 65 p. 44 plates, photos (fold.), charts. **DWB**—In the first annual report, results of aerial ice reconnaissance flights by Navy patrols, RCAF and U. S. Air Weather Service, MATS, and other flights over the Labrador Sea, Baffin Bay and Davis Strait (as well as reports from icebreakers), are summarized for the period March–Sept. 1952 and colored fold-charts for each week from April 29–Sept. 29, showing details of ice conditions in the area included along with the extensive narrative of ice and weather conditions during the season. Forecast procedures and detailed recommendations for future seasons outlined. Photographs of ice conditions, a good bibliography and sample observers forms, charts, etc. are included. The 2nd annual report gives similar information for the navigation season of 1953, with emphasis on planning, reconnaissance, forecasting and dissemination of reports and forecasts for operational use. *Subject Headings:* **1. Ice reconnaissance 2. Ice forecasting 3. Ice condition charts 4. Labrador Sea 5. Baffin Bay 6. Canadian Arctic.**—*M.R.*

8.9–90 511.311.12

Millecamps, Roland, **Sur l'application de la photogrammétrie terrestre à l'étude de la Mer de Glace.** [Application of ground photogrammetry to the study of the Mer de Glace.] *Académie des Sciences, Paris, Comptes Rendus,* 242(1):159–161, Jan. 4, 1956. Also his: **Sur les directions d'écoulement superficiel d'un tronçon de la Mer de Glace.** [Directions of surface flow in a glacier tongue of the Mer de Glace.] *Ibid.,* 242(3):397–400, Jan. 16, **1956.** 3 figs. Also his: **Sur la variation des vitesses d'écoulement superficiel de la glace d'un tronçon de glacier.** [Velocity variations in the surface flow of ice in a glacier tongue.] *Ibid.,* 242(6): 803–806, Feb. 6, **1956.** fig., table, 6 refs. **DLC**—Studies of aerial photographs of a portion of the Mer de Glace on Mont Blanc, made in 1953 showed marked changes in the length and thickness of the ice, opening of crevasses, etc. But these measurements, even though indicating great shrinkage, do not give the details of the movement of any portion of the ice. Land photographs, made from July 31 to Sept. 22, 1954 simultaneously from two points and twice a day, and analyzed in connection with seismic records already available, gave much more precise information on the trajectories of ice particles in a three-dimensional framework. It was found that the trajectories were not rectilinear but sinusoidal with periods of acceleration and deceleration at more or less regular intervals, but with a mean speed of 18 to 24 cm per day. Direction of the flow at a given point appears to be closely linked to the morphology of the base. *Subject Headings:* **1. Glacier flow 2. Photogrammetric glacier surveying 3. Mer de Glace, Mont Blanc.**—*M.R., G.T.*

8.9–91 551.311.1

Sharp, Robert P., **Objectives of Antarctic glaciological research.** *American Geophysical Union, Geophysical Monograph,* No. 1:27–35, **1956.** 51 refs. **DLC**—The author discusses the program of glaciological research to be carried out by U. S. glaciologists in Antarctic during the current IGY. This includes the volume of Antarctic ice, variations in volume of Antarctic ice, drilling and coring of ten 300 meter holes (on the inland ice at Byrd Station and near Little America V on the Ross Ice Shelf), firn stratigraphy, thermal regime, crystal fabrics on glacier ice, glacier movement, accumulation and wastage of glaciers, and climatic fluctuations in Antarctica. The discussion summarizes the present state of knowledge on these subjects and the various techniques employed in these studies. *Subject Headings:* **1. Glaciological research 2. IGY glaciological program 3. Antarctic ice.**—*I.L.D.*

GEOMAGNETISM

See also: **Geomagnetic activity in troposphere** (London et al.), 8.9–187.

8.9–92 550.384

Barta, György, **A földmagnessegi erö változásai Magyarorszagon: a Budakeszi observatórium eredményei 1949–50 ben, $\varphi = 47°31{,}4'$N, $\lambda = 18°53{,}8'$E. Gr.** [Variation of terrestrial magnetism in Hungary: results of the observations at Budakeszi in 1949–1950, $\varphi = 47°31{,}4'$N, $\lambda = 18°53{,}8'$E. Gr.] Budapest, Akadémiai Kiado, **1954.** 146 p. figs., numerous tables, eqs. Text in Hungarian, Russian and German. **DLC**—Elaborate tables of geomagnetic observa-

tions made at Budakeszi are presented for 1949–50. Seasonal and secular variations are discussed at length, and the history of the station and its restoration in 1948 described. *Subject Headings:* **1. Geomagnetic yearbooks 2. Geomagnetic stations 3. Geomagnetic variations 4. Budakeszi, Hungary.**—*M.R.*

8.9–93 550.38:551.46

Espersen, J.; Andreasen, P. (*both, Univ. of Copenhagen*); Egedal, J. and Olsen, J. (*both, Danish Met. Inst., Copenhagen*), **Measurements at sea of the vertical gradient of the main geomagnetic field during the *Galathea* expedition.** *Journal of Geophysical Research*, Wash., D. C., 61(4):593–624, Dec. **1956.** 13 figs., 6 tables, 15 refs. **DLC**—During the Danish "Galathea" expedition, 1950–52, investigations were made of the vertical gradient of the geomagnetic field, in an attempt to test the probability of the new "fundamental" theory for the main geomagnetic field proposed by P. M. S. Blackett in 1947. Three relative, self-recording magnetometers—one needle instrument measuring the Z-component, one needle and one rotating-coil instrument measuring the H-component—are described. All instruments may be lowered to extreme depths in the sea in non-magnetic containers. In the Pacific Ocean, a series of trial measurements were carried out, and at least one of the H magnetometers proved to be of the desired accuracy of 10γ during a single relative measurement. All trial stations were situated in places with locally disturbed geomagnetic field, which makes the gradient results unreliable, and a breakdown of the technical equipment of the surveying vessel prevented measurements at stations better suited to magnetic work. However, summed up, the trial results indicate a case against the fundamental theory—in accordance with gradient measurements ashore in mines and collieries. *Subject Headings:* **1. "Galathea" Expedition, 1950–1952 2. Vertical gradient of the geomagnetic field 3. Magnetometers 4. Pacific Ocean.**—*Authors' abstract.*

8.9–94 550.385:550.388

Parker, E. N. (*Inst. for Nuclear Studies, Univ. Chic.*), **On the geomagnetic storm effect.** *Journal of Geophysical Research*, Wash., D. C., 61(4):625–637, Dec. **1956.** fig., 13 refs., 45 eqs. **DLC**—The high electrical conductivity of the region surrounding earth, inferred from the observations of atmospheric whistlers and the zodiacal light, requires abandoning the customary models for producing a geomagnetic storm field with impressed current system. It becomes necessary to adopt a purely hydromagnetic approach wherein one focuses his attention only on the magnetic lines of force of the geomagnetic field and their displacement with the conducting gas surrounding earth. From the hydromagnetic point of view, a decrease of the horizontal component is brought about by lifting the lines of force in the region above the observer. It is suggested that heating in the upper atmosphere may produce the necessary lifting; this model, along with another, is developed quantitatively to show that lifting the lines of force a distance of only 5 km will produce a decrease in the horizontal component of 0.2 per cent at the equator. *Subject Headings:* **1. Magnetic storms 2. Geomagnetic theory.**—*Author's abstract.*

8.9–95 550.384.4(584)

Thiruvengadathan, A. (*Astrophysical Obs., Kodaikanal*), **The magnetic disturbance field at Kodaikanal.** *Indian Journal of Meteorology and Geophysics*, Delhi, 7(4):380–384, Oct. **1956.** 4 figs., 6 tables, 8 refs. **DWB, DLC**—The magnetic disturbance field at Kodaikanal has been studied, using the data for the period March 1950 to February 1954. As far as the horizontal magnetic field is concerned, it is found that the form of the disturbance daily variation does not depend on the degree of disturbance. During equinoxes and winter solstices, the disturbance vector, S_D is at right angle to the S_q vector (quiet day diurnal variation) and is at an obtuse angle to the S_q vector during summer solstice. Hence with increasing disturbance there is a pronounced variation of the phase of S (diurnal variation) vector, but the variation in its amplitude is small. This suggests that the phase, rather than the amplitude of the variation may be a better criterion for determining the intensity of a disturbance. It is also noticed that the storm time field too retains its form at various levels of disturbance. The variation in the vertical force is found to be too small to give any significant results. *Subject Headings:* **1. Magnetic disturbance field 2. Kodaikanal, India.**—*Author's abstract.*

AGRICULTURAL METEOROLOGY

See also: **Agric. met.** (Protserov), 8.9–2; **Agroclimatic handbook for Moscow,** 8.9–19; **Agric. hydrol.** (Schroeder), 8.9–271; **Agroclimat. res.** (Havens), 8.9–278; **Arid zone agric.** (Dickson), 8.9–298; **Bioclimat. of plants** (Hudson), 8.9–300.

8.9–96 551.584.61:551.586:631

Allerton, F. W., **This age of plastics.** *Commercial Grower*, London, No. 3189:327–331, Feb. 15, **1957.** 4 figs.—Half a cucumber house was lined with .0015″ polythene sheeting ("thermoplus"). Temperature was 15°F higher than in unlined half, but air circulation was slowed down, humidity rose, condensation occurred and effective light was cut down. Half-lining preserves the advantages. A grade 3 times as thick is an alternative to glass. Other uses are described. *Subject Headings:* **1. Greenhouse climates 2. Plastic greenhouses.**—*C.E.P.B.*

8.9–97 551.573:636.2

Berman, A., **Influence of some factors on the relative evaporation rate from the skin of cattle.** *Nature*, London, 179(4572):1256, June 15, **1957.** 2 refs. **DWB**—Variability of evaporation rate among cows in Jordan Valley was studied by color changes of cobalt chloride anhydride. Highly significant variations were found between skin of different parts and between cows. *Subject Headings:* **1. Cattle 2. Skin evaporation.**—*C.E.P.B.*

8.9–98 551.586:631

*Gentilli, J. (*W. Aust. Univ., Dept. Economics*), **Wheat yields in Western Australia.** [Pub. by] Trustees of the Wheat Pool of Western Australia [after **1949**]. 65 p. entirely tables. Mimeographed. **MH-BH**—In studying trends in wheat yields in western Australia (1907–1949), no attempt was made to eliminate effect of variable rainfall, because of the labor involved. However the effect of two bad droughts: one in 1914–15 and one in 1940–41, was considered. In general the trend has been toward better yields as time passed but in the last few years a decline has set in. This must be due to either decreasing rainfall or decrease in soil fertility. Since no decrease in rainfall has been evident, it is inferred that soil has become poorer. Annual yields are given for each of 65 places, the period of second divided into groups and results enclosed for each place. *Subject Headings:* **1. Rainfall effects 2. Wheat yields 3. Drought 4. Western Australia. I. Wheat Pool of Western Australia.**—*M.R.*

8.9–99 551.586:633.11

Geslin, H. (*Inst. Nat. de la Recherche Agron.*), **Qualité des blés et climat.** [Climate and the quality of wheat.] *La Météorologie*, Ser. 4, No. 36:309–318, Oct./Dec. **1954.** 3 tables. French, English and Italian summaries p. 309. **DWB**—The method and results of an investigation carried out by the author in 1948–1953 of the influence of climate on the extensimetric characteristics of wheat grains are presented and discussed. The same kind of wheat (Vilmorin 26) was sown in fields of experimental agricultural stations in the regions of Paris and Clermont-Ferrand (Limagne plain). The favorable influence of the more continental climate of Clermont-Ferrand on the quality of the grain registered in greater or lesser degree depending on weather conditions of the year during the whole time of the investigation is discussed. *Subject Headings:* **1. Climatic effects 2. Wheat production 3. Clermont-Ferrand, France.**—*A.M.P.*

8.9–100 551.586:633

Kirkwood, Margaret (*comp.*), **Banana growing at Carnarvon, W. A.** *Western Australia. Univ. Geographical Laboratory, Research Report*, No. 36, June **1952.** 11 p. figs., table, 2 refs. Mimeo. **DA**—A brief summary of hot dry climate of Carnarvon, West Australia, which makes banana raising possible (there are 171 plantations) although normally bananas require a hot humid climate with very heavy rainfall. This area gets only 9″ of rain (on average) a year and most of it falls in winter, so heavy irrigation is needed. Average monthly maximum and minimum temperature, rainfall and rainy days are shown in tables. As the area is subject to strong winds and hurricanes, windbreaks must be developed to protect the bananas. *Subject Headings:* **1. Climate of Carnarvon, West Australia 2. Banana cultivation 3. Carnarvon, West Australia.**—*M.R.*

8.9–101 551.5:63

§*Kramer, C.; Post, J. J., and Scharringa, M., **Weer, klimaat en landbouw.** [Weather, climate and agriculture.] Zwolle, W. E. J. Tjeenk Willink, **1952.** 92 p. 31 figs. (incl. photos and 2 fold.), 10 tables. (*Leidraad voor het land- en tuinbouwonderwijs. Ser. B*, No. 24). **DLC**—A small textbook or manual discussing: I. Weather, climate and agriculture in general, II. Weather phenomena, forecasts, reports, etc., III. Climate (temperature, precipitation, sunshine, wind, hail, frost and instrumental equipment) and IV. Agrometeorological research and service for potato, apple and pear growers, and radio reports and forecasts for farmers in Holland. Illustrations and data are mainly for the Netherlands —on p. 63–65 is a full discussion of temperature singularities for De Bilt based on 90 years of record (1849–1941), showing that the main singularities are not "fixed" but vary over 10 days-2 weeks from period to period within the long period record. *Subject Headings:* **1. Agricultural meteorology 2. Temperature singularities 3. Netherlands.**—*M.R.*

8.9–102 551.5:63:061.1

Sinel'shchikov, V. V., **Gidrometeorologicheskaia sluzhba na vsesoiuznoĭ sel'skokhoziaĭstvennoĭ vystavke.** [Hydrometeorological service for the All-Union Agricultural Exposition.] Ed. by F. F. Davitaia. Leningrad, Gidrometizdat, **1955.** 83 p. figs. and photos. **DWB**—An attractive and informative pamphlet giving the details of: the Hydrometeorological Pavilion at the All Union Agricultural Exposition in Moscow (starting Aug. 1, 1954). The various exhibits for the agrometeorological and hydrometeorological services of the Central and regional meteorological offices are described and illustrated. The history of the Russian Meteorological Service (beginning with the pioneer work of LEMONOSOV, the Central Geophysical Observatory, etc.), the functions of the Hydrometeorological Service, especially for agriculture, the special services for the Kolkhoz, for wheat and cotton growers, the regional services, a description of many institutions and services are discussed; a list of 89 participating regional offices and of 213 heads of agro- or hydrometeorological offices is included. *Subject Headings:* **1. Agrometeorological services 2. Agrometeorological exhibits 3. Agricultural exposition 4. Moscow, U.S.S.R.**—*M.R.*

FOREST METEOROLOGY

See also: **Wind effects on trees, Italian Riviera** (Runge), 8.9–230; **Climat. effects on tree ring widths** (Eklund), 8.9–303.

8.9–103 551.584.41:551.585.7

Aulitzky, H. (*Innsbruck*), **Die Bedeutung meteorologischer und kleinklimatischer Unterlagen für Aufforstungen im Hochgebirge.** [The importance of meteorological and microclimatic foundations for alpine afforestation.] *Wetter und Leben*, Vienna, 7(8/11):241–252, **1955.** 5 figs., 2 tables, 17 refs. **DLC**—The author briefly discusses the role of deforestation in avalanche occurrence, the ecological factors in plant growth and the interaction of factors, such as soil moisture, air temperature, leaf temperature, etc. in the growth and development of plants and plant associations. The erection of a base climatic station suitable to altitude and slope position, analysis of the climatological-physiological factors relevant to the most important forest species and the determination and presentation of the distribution of climatic factors on the basis of their selective action on plants are taken up. The interaction of light and shade, wind and snow cover, soil, air temperature in forest stands and their effect upon tree growth are analyzed with the aid of specific climatic data obtained at Poschach Obergurgl in the Austrian Alps. Data are presented graphically and tabularly. *Subject Headings:* **1. Avalanche protection 2. Afforestation 3. Alpine meteorology 4. Alpine microclimatology 5. Austrian Alps.**—*I.L.D.*

8.9–104 551.577.52

*Beard, J. S. (*Natal Tanning Extract Co., Pietermaritzburg*), **Hydrological studies in the Natal wattle belt.** *South African Forestry Association, Pretoria, Journal*, No. 25:40–51, **1955.** 5 plates (photos), 3 refs. Also his: **Results of the Mountain Home rainfall interception and infiltration project in black wattle, 1953/54.** *Ibid.*, No. 27:72–85, **1956.** 5 figs., 5 tables,

6 refs. English and Afrikaans summaries p. 72–73. **DWB** —In the 1955 paper, the author describes rainfall, runoff and soil moisture studies made at the Mountain Home wattle plantation on Hilton Road, Central Natal, from July 1953-June 1954 (and continued in some phases since). The purpose of the investigation was to determine rainfall interception and loss by trees, grass, soil, etc. Rainfall records from 31 stations in 6 districts (1500–4500 ft elev) was analyzed for period 1890–1952, showing peaks in 1893, 1919 and 1940–42 and drought in 1900-04, 1929–32 and 1948. Equipment, plots and hydrometric research are described. In the 1956 paper the data on interception, stemflow and runoff is analyzed and evaluated statistically in many different ways to show effects of forests. For instance the overall interception by the canopy is estimated at 15–20% (40% with light rains and 13% with heavy), while net rainfall is due 86% to throughfall and 14% to stemflow in light rains (stemflow is higher than in storms), under grass, throughfall in 53%–67%. *Subject Headings:* **1. Hydrologic studies 2. Precipitation interception by forests 3. Wattle belt 4. Natal, South Africa.**—*M.R.*

8.9–105 632.187

Davis, Kenneth P. (*Prof. Forest Management, Univ. of Michigan*), **Forest fires in Georgia: problems and research needs.** Report prepared for the Georgia Forestry Commission and the Southeastern Forest Experiment Station, U. S. Forest Service. (1956). 10 p. photos., figs., table. **DWB**—A report on findings of the author in a study of the fire situation in Georgia, and recommendations to the Georgia Forestry Commission as to research needs. Georgia ranks second to Oregon in total forest area and first in the U. S. in privately owned and accessible forests, in acreage of non-Federal forests. Fires are 97% man-made and 25–30% of incendiary origin. Protection increases amount of fuel available. Adverse weather conditions, especially drought when swamps dry up and become inflammable and are also nearly impenetrable, occurred in 1951-55, resulting in bad fire years of 1954 and 1955. Research expenditure on fire control in the S.E. states amounts to only $47,000 a year, or 0.4 of 1% of total expense for fire control in area. A rational research program for Georgia is outlined. *Subject Headings:* **1. Forest fire research programs 2. Forest fires in Georgia 3. Georgia.**—*M.R.*

INDUSTRIAL METEOROLOGY

See: **Fog protection of shipping** (Colbeck et al.), 8.9–78; **Solar energy utilization** (Baum), 8.9–190; **Wind structure with reference to generators** (Wax), 8.9–213; **Corrosion of metals** (Sanyal, Singhania), 8.9–242; **Corrosion of metals** (Schulze), 8.9–279.

8.9–106 551.556.3:621.311.24

Golding, E. W., **Electrical energy from the wind.** Discussion by J. Venters, J. Griffin, W. R. Gatliff, et al. *Institution of Electrical Engineers, London, Proceedings, Pt. A*, 103(12): 616–618, Dec. 1956. (For abstract on original paper, *see* 7.11-87, Nov. 1956, *MAB.*) **DLC** – Numerous comments and questions on use of wind generators in various parts of the United Kingdom. Experience has shown that wind generators become less in demand as national power networks spread into isolated regions (e.g., in N. Scotland). Matters of esthetic values, time when calms prevail over a whole region or network, use of wind power to supplement water power which can meanwhile be stored, comparative usefulness of small, medium and large generators, low medium and high wind speeds, etc. are discussed. *Subject Headings:* **1. Wind generators 2. Great Britain.**—*M.R.*

8.9–107 551.5:6

Hartnett, William J., **Weather Corporation of America: weathermen for industry.** *American Meteorological Society, Bulletin*, 37(10):530–532, Dec. 1956. 4 photos. **DWB**—Some of the forecasting and consulting activities of the Weather Corporation of America (offices in New York and St. Louis) are outlined and illustrated. Service is to industry, shipping, insurance companies, manufacturers, air conditioning and highway engineering, utilities and hydrological interests (cloud seeding). *Subject Headings:* **1. Industrial meteorologists 2. Commercial cloud seeding 3. St. Louis, Missouri.**—*M.R.*

8.9–108 551.521.1:621.47

Maszlo, Tibor S. (*High-Temperature Lab., Fordham Univ.*), **Solar furnace in high-temperature research.** *Science*, Wash., D. C., 124(3226):797–800, Oct. 25, 1956. 6 figs. (incl. photos), 4 refs. **DLC**—Conventional high temperature furnaces are described, advantages of the solar furnace in high temperature research enumerated and the construction and operating principles of this solar furnace described. The Fordham Solar Furnace (60″ diam.) has attained 3500°C compared with 2700°C for the conventional induction furnace. Correlation of reflector dimensions with maximum obtainable temperature shows upper limit at 4500°–4800°C as the curve becomes asymptotic at 3–4 m diameter. Radiant energy is a pure heat source—no combustion products are involved. No crucible is needed and other parts of the furnace remain at or near atmospheric temperature. Only a few seconds are needed to raise temperature to 3500°C, so cycle of heating may be short. Observation and measurement are also simpler and no electromagnetic field is present to affect instruments used. *Subject Headings:* **1. Solar furnaces 2. High temperature research.**—*M.R.*

8.9–109 551.556.3:621.311.24

Utilization of wind power in India. *Current Science*, Bangalore, 25(6):180–181, June 1956. **DWB, DLC**—India Meteorological Dept. is assisting the Wind Power Sub-Committee of the Council of Scientific and Industrial Research (under Dr. P. Nilakantan) in making a survey of available wind data, anemograph records, etc. to compile velocity-duration and power-duration curves and correlation between average hourly wind speed and available power in various regions. More detailed surveys are now being made to assess the power available at optimum sites not represented by meteorological stations. Over 20,000 small windmills for rural areas, a few hundred middle size plants for electric supply, pumping, etc. and 20 wind surveys stations in different regions are contemplated. *Subject Headings:* **1. Wind power studies 2. Wind utilization 3. India. I. Nilakantan, P.**—*M.R.*

PUBLIC HEALTH

See also: **Radioactivity in the atmosphere** (Israël), 8.9–5; **Radioactivity in oceans** (Revelle et al.), 8.9–82; **Radioactivity in the atmosphere** (Reiter), 8.9–317; **Radioactivity of rainwater** (Teichert), 8.9–318.

8.9–110 551.586:615.834

Mörikofer, W. (*Physikalisch-Meteorologisches Obs. Davos*), **Gesichtspunkte der Kurortklimatologie.** [Scope of health resort climatology.] *Wetter und Leben*, Vienna, 7(8/11): 264–267, 1955. 7 refs. **DLC**—The author discusses the scope of resort climatology, the meaning of the concept "resort climate," the physical constituents of resort climate such as insolation and radiation, warmth factors, humidity and precipitation, elevation above sea level and geographical location, climatic data necessary for resort climatology, etc. *Subject Headings:* **1. Health resorts 2. Resort climatology.**—*I.L.D.*

METEOROLOGICAL OBSERVATIONS AND INSTRUMENTS

METHODS OF OBSERVATION

See also: **Obs. techniques for hydrometeorologists** (Skliarov), 8.9–6; **Arctic weather stations,** 8.9–34; **Hohenpeissenberg Obs., 1781–1955** (Grunow et al.), 8.9–48; **Mt. Washington Obs.** (Kuettner), 8.9–49; **McMath-Hulburt Obs.** (McMath), 8.9–50; **Airplane wind obs., Pacific,** 8.9–72; **Wind frequency calculation** (Wadsworth), 8.9–75; **Humidity measurement by radiosonde** (Sokolov), 8.9–138; **Min. temp. computation** (Kopáček), 8.9–145; **Ionospheric wind measurement** (Harnischmacher, Rawer), 8.9–161; **Precip. atmos. models** (Atlas, Kessler), 8.9–256.

8.9–111 551.501:551.578.11

Krasnogorskaia, N. V., **Fotoelektricheskiĭ metod issledovaniia raspredeleniia razmerov chastits osadkov.** [Photoelectrical method of investigating the distribution of particles size

in precipitation.] *Akademiia Nauk SSSR., Izvestiia, Ser. Geofiz.*, No. 6:529–537, Nov./Dec. 1955. 6 figs., 2 tables, 5 refs., 4 eqs. **DLC**—Measurements of droplet size and charge of heavy shower rain were carried out during June to Oct. 1953 at one of the stations of the Elbrus expedition of the Geophysical Institute of the Academy of Science of the U.S.S.R. in the Jerskol Valley (Elbrus District). A photoelectric method using apparatus for measuring simultaneously the size and charge of rain droplets under field conditions without destroying their shape and condition is described. The charge was measured with the method of induction coil and the size by a photoelectric and filter paper method. The results of the measurements show that (1) the number of droplets falling from frontal cumulus clouds decreases monotonically as their size increases, (2) the rains contained charged droplets of both signs and also neutral droplets and (3) a comparison of simultaneous measurements of the structure of rain with the drop meter and the filter paper method are in satisfactory agreement. *Subject Headings:* **1. Drop size distribution measurement 2. Electrical charges on drops.**—*I.L.D.*

8.9–112 551.501.4:551.521

Möller, F., **A simplified method of computing the radiation balance in the troposphere.** *I.U.G.G. Association of Meteorology, Rome, Sept. 1954, Scientific Proceedings*, London, Butterworth, 1956. p. 561–565. 2 figs., ref. **DWB**—The simplified method of computing the long wave radiation balance in the free atmosphere is based upon the determination of the upward radiational flux of the atmosphere in a selected level as a function of the temperature and water vapor content in that level and of the downward radiation flux. It is assumed that the atmosphere is stratified according to the mean conditions of the atmosphere. The author presents charts showing long-wave radiation conditions in the troposphere during a westerly flux over Europe and during a high pressure situation extending from western France to the coast of Norway. *Subject Headings:* **1. Radiation balance calculations 2. Infrared radiation 3. Stratification of atmosphere.**—*I.L.D.*

8.9–113 551.501.45:551.542.1

Drogaĭtsev, D. A., **Postroenie polia geostroficheskogo vetra nad morem.** [Construction of the geostrophic wind field over the sea.] *Meteorologiia i Gidrologiia*, Leningrad, No. 2:41–44, Feb. 1956. table, 3 eqs. **DWB, DLC**—In the formula for calculating the velocity of the geostrophic wind the magnitude and direction of the pressure gradient must be determined precisely. The inadequacies of existing methods are pointed out and a procedure is proposed for determining the pressure gradient near the center of cyclones and anticyclones and in a hyperbolic region. *Subject Headings:* **1. Geostrophic wind calculation 2. Pressure gradient.**—*I.L.D.*

8.9–114 551.501.6:518.3:551.521.3:551.593.54

Danč, Ján, **Nomogram pre nový zakalový činitel' Linkeho.** [Nomogram for the new Linke turbidity factor.] *Meteorologické Zprávy*, Prague, 8(3):71–75, June 1955. 3 figs., 4 tables, eqs., 3 refs. Russian and German summaries p. 71. Also his: **Nomogramy pre nový zákalový činitel' Linkeho.** [Nomograms for the new Linke turbidity factor.] *Ibid.*, 9(4):90–97, 1956. 3 figs., 6 tables, 3 refs., eqs. Russian and German summaries p. 90–91. Also: Sobíšek, Bořivoj, **Nomogram k výpočtu nového zákalového činitele podle Linkeho pro zření za žlutým filtrem OG 1** ($\lambda->0{,}525\mu$). [Nomogram for computing the new Linke turbidity factor for raditaion through a yellow OG 1 filter ($\lambda->0.525\mu$).] *Ibid.*, 10(1):8–13, 1957. 3 figs., 5 tables, 4 refs., 3 eqs. Russian and German summaries p. 8. **DWB**—The nomogram published in **Handbuch der Geophysik** for determining Linke's new turbidity factor for total radiation has been found to seriously lack accuracy. Correct numerical values are developed in the first of these papers and the nomogram obtained is presented for use in actinometry. In the second paper the nomogram for total radiation is reproduced in larger format and two additional nomograms are presented, namely one for infrared and one for short-wave radiation. The three nomograms have been adopted for routine use by stations in the Czechoslovak actinometric network effective Jan. 1, 1956. With their help turbidity factors may be determined with an accuracy of ± 0.01. Sobíšek works out and presents the nomogram for the OG 1 yellow filters use with Michelson-Marten actinometers. *Subject Headings:* **1. Nomograms 2. Turbidity factor.**—*G.T.*

8.9–115 551.501.7:551.513

Klein, William H. (*Ext. Fore. Sec., U. S. W. B., Wash., D. C.*), **The circulation and weather of 1956.** *Weatherwise*, Boston, 10(1):8–13, 33, Feb. **1957.** 7 figs. **DWB, DLC.** Also issued in mimeographed form. **DWB** (M13 U587c)—A discussion of synoptic weather month by month for 1956. The zonal index did not go above normal from Oct. 28, 1955 to Feb. 21, 1956—the longest period of continuous low index ever observed. On Jan. 7–11, 1956 the 5-day mean 700 mb index was the lowest on record (on Jan. 11–15, the sea level index was lowest on record), as a result record 700 mb height anomalies appeared in the Labrador (+680′) and Aleutian region (+600 ft), and unusual drought in the central U. S. and floods or heavy rains in Far West and northeastern states. April 1956 was also a month with very low index. Summer and fall weather are also discussed. Charts show unusual features of some of the months. *Subject Headings:* **1. Zonal index 2. Record low zonal index 3. North America.** —*M.R.*

8.9–116 551.501.7:551.551

Landers, H. and Sipple, Milton H., Jr., **Study of small-scale atmospheric motion, Pt. 1, Local rate of ascent of the thirty-gram balloon.** Florida. State Univ. Dept. of Meteorology Contract Nonr-1600(00), Technical Report, No. 2, Sept. 15, **1955.** 21 p. 2 figs., 7 tables, 7 refs., 3 eqs. **DWB** –The preliminary work toward determining the magnitude and distribution of the horizontal divergence and the vertical component of the relative vorticity of the horizontal field of motion in a small area is reported. This consisted mainly of determining locally the rate of ascent of the 30-gram balloon. Mean curves for the local ascensional rates at 1000 EST and 2200 EST are compared with the assumed ascensional rate. Above the friction layer, the mean local ascensional rates are shown to be significantly greater than the assumed rate. Pt. 2 of this report dealt directly with the divergence and vorticity obtained by this method. (For Pt. 2, *see* 8.3–150, March 1957, *MAB.*) *Subject Headings:* **1. Balloon. ascension rates 2. Turbulence research.**—*Authors' abstract.*

8.9–117 551.501.7:551.557

Shaffer, Russell W. (*Dept. of Met., Florida St. Univ., Tallahassee*), **On the existence of a systematic error in the measurement of winds aloft.** *American Meteorological Society, Bulletin*, 38(3):138–139, March **1957.** fig., table, 2 refs. **DWB, DLC**—A systematic test was made using winds aloft data from 30 and 100 gram balloon soundings at Lake Charles and Nashville for Feb. 1954 and Tallahassee for May 1955, to determine the average % error and number of cases of observed wind speeds (in m/sec) due to the method of two-min averaging. The results are indicated on a graph and in a table. It can be seen that the % error decreases rapidly with increase in wind speed, that most of the errors lie below one knot of absolute error so that it is only at low wind speeds that the error (due to using 2 minute averages) is of any great consequence except in rare cases, and that the error in reported wind speed will always be too low. *Subject Headings:* **1. Upper air wind measurement errors 2. Errors due to averaging.**—*M.R.*

8.9–118 551.501.81:551.515.3(764)

Bigler, Stuart G. (*Dept. of Oceanog. and Met., A. & M. College of Texas*), **Note on the successful identification and tracking of a tornado by radar.** *Weatherwise*, Boston, 9(6):198–201, Dec. **1956.** 4 figs. **DWB**—An illustrated account of what is believed to be the first successful identification of a tornado situation (which produced damage in Bryan, Texas) and timely warnings so that school children were kept in schools instead of being dismissed just before the storm passed over the town. The storm was in an area designated 3 hours earlier by the U. S. W. B. Forecast Center at Kansas City as a danger area for severe storms. The storm echo was picked up by the Texas A. & M. 10-cm radar about 1340 CST on the 5th of April, 1956. The tornadoes hit Bryan and College Station at 1509 with winds of 75 knots and hail. Damage was mainly to unoccupied houses and warehouses. *Subject Headings:* **1. Radar tornado detection 2. Radar tornado photographs 3. Tornadoes, Bryan, Texas (Apr. 1956) 4. Bryan, Texas.**—*M.R.*

8.9–119 551.501.81:551.515.3(781)

Brokaw, G. E. (*U. S. W. B., Topeka, Kans.*), **Radar echo and associated tornado damage near Topeka, Kans., April 2, 1956.** *Monthly Weather Review*, Wash., D. C., 84(4):165, April 1956. fig. **DWB, DLC**—A sketch is reproduced of radio echo 2335 CST Topeka, Kansas, April 2, 1956 and approximate tornado damage paths and locations where time of damage is definitely known are shown. The echo and its development and progress are described. *Subject Headings:* **1. Radar echoes from tornadoes 2. Radar tornado detection 3. Tornado warnings 4. Tornadoes, Topeka, Kansas** (April 1956) **5. Topeka, Kansas.**—*I.L.D.*

OBSERVATIONAL DATA

See also: **Climatic summaries, Canada** (Boughner), 8.9–23; **Upper air data, "Severnyi Polius-4"** (Gaigerov), 8.9–32; **Record cold spells, France** (Arléry), 8.9–225.

8.9–120 551.506:551.521

*Bider, M. (*Basel*), **Zwei Jahre Strahlungsmessungen in Basel mit dem Bellani-Luzimeter.** [Two years of radiation measurements in Basel with the Bellani radiation meter.] *Schweizerische Naturforschende Gesellschaft, Verhandlungen*, 135:111–112, **1955.** 2 tables. **DWB**—The results of the global radiation measurements carried out from Sept. 1953 to Aug. 1955 at the Physical and Meteorological Observatory of Davos at a 1.8 m height over a grass path are presented in a table and show clearly that the annual variation due to the peculiarity of the years, reached the maximum in May. The relation of monthly global radiation to sunlight duration varies between 29 and 38 cal per sunshine hour and does not show any annual variation. *Subject Headings:* **1. Radiation measurements 2. Global radiation 3. Annual radiaton variations 4. Basel, Switzerland.**—*A.M.P.*

8.9–121 551.506:902

Jacobs, W. C. and Molo, William L., **Basic weather data: a survey of current control practices.** *World Meteorological Organization, WMO Bulletin*, 5(4):126–131, Oct. **1956.** 2 photos. **DWB**—A summary, prepared from the report of the Working Group of the Commission for Climatology on Arrangements for International Exchange of Historical Weather Data, covering the essence of replies received from 55 national services to a questionnaire on national practices in storage and annotation of basic weather data (in its broader aspects). International control must wait for effective control at a national level, although a small start on IGY data during 1957 and 1958 is in order. Procedures for collection, card punching, annotation (maintenance of catalogs and inventories), dissemination and use of basic records and publication of summarized data are discussed. Increasing awareness of the value of the records will lead to better control. *Subject Headings:* **1. Historic weather records 2. Data control centers 3. WMO. Climatology Commission. Working Group on International Exchange of Historical Weather Data.**—*M.R.*

8.9–122 551.506.1(6,59)

*France. Météorologie Nationale, **Annales des services météorologiques de la France d'Outre-Mer, 1952.** pub. **1956.** 2 v. Vol. 1, **Territoires Français de l'Afrique Noire. Vol. 2, Territoires Français de l'Ocean Indien du Pacifique et de l'Amérique, États Associés de l'Indochine.** Almost entirely tables. At head of title: Service Central de la Météorologie de la France d'Outre-Mer and Direction de la Météorologie Nationale. "Supersedes the **Resumé Climatologique Annuel** issued by each territory of Overseas France prior to 1951." **DWB**—In Vol. I will be found extensive data for numerous stations in French West Africa, French Equatorial Africa and Cameroons (Ivory Coast, Dahomey, Guinea, Haute-Volta, Mauritania, Nigeria, Senegal, Sudan, Togo, Gabon, Middle Congo, Ubangi-Chari, Chad, and Cameroons) arranged in standard machine tabulation type tables for all of the standard elements for each month. Data include pressure, wind direction and velocity frequencies at 3 of the 4 synoptic hours, evaporation, sunshine, cloudiness, humidity (relative and absolute), etc. Vol. 2 contains similar tabulations for Magadascar, Réunion, Amsterdam and Kerguelen, French Somaliland, Indochina, New Caledonia, New Hebrides, Oceania, Antilles, Guiana, St. Pierre and Micquelon. *Subject Headings:* **1. Annual meteorological data summaries 2. French Africa**

3. Indochina 4. Madagascar 5. Réunion 6. Amsterdam 7. Kerguelen 8. St. Pierre and Miquelon.—*M.R.*

8.9–123 551.506.5(267)

*Jalu, R., **Mission aux Iles Kerguelen, 1949–1950, Météorologie, Rapport préliminaire: observations synoptiques.** [Mission to the Kerguelen Isles, 1949–1950, section on meteorology, preliminary reports: synoptic observations.] Paris, **1954.** 33 p. almost entirely tables. At head of t-p: . . . Direction de la Météorologie Nationale. **DWB**—Tables give 3-hourly observations *in extenso*, for usual synoptic weather elements and hours of sunshine during each day from Jan. 1–March 31, 1950 for Port-aux-Français, Kerguelen 49°20′S, 70°13′E, 14 m above sea level. No observation was made at 02h local time (75th mer. E). (*See also* 6.9–17, Sept. 1955, *MAB.*) *Subject Headings:* **1. Observational data 2. Expeditionary meteorological data 3. Port-aux-Français, Kerguelen Island.**—*M.R.*

8.9–124 551.506.7:551.577(47)

Drozdov, O. A., **O razlichiiakh v znacheniiakh temperatury i vlazhnosti v svobodnoĭ atmosfere v dni s osadkami i v dni bez osadkov.** [Differences in the temperature and humidity of the free atmosphere on days with and without precipitation.] *Leningrad. Glavnaia Geofizicheskaia Observatoria, Trudy*, 50(112):16–20, **1955.** 4 tables, 3 refs. **DAWS**—Morning and night aerological observations of atmospheric temperature and relative humidity on days with all types of rainfall and without rainfall were analyzed for the period April–Oct. 1948 for all stations of the southern European part of the U.S.S.R. Data are presented on gradient difference in temperature and relative humidity on days with and without precipitation, mean differences in temperature of the free atmosphere and relative humidity on days with and without precipitation, probability of general and low level cloudiness and of different types of clouds corresponding to this cloud cover during the aerological observations (1948), and frequency of cloudiness in instances when the relative humidity at 1.5 km is greater than 80% and lower than 40%. *Subject Headings:* **1. Upper air data 2. Rainfall effects on upper air 3. Southern European U.S.S.R.**—*I.L.D.*

8.9–125 551.506.7(468.2)

*Great Britain. Meteorological Office, **Upper air data for stations maintained by the Meteorological office: summaries of radio-sonde observations of temperature and humidity and of radar wind measurements at standard pressure levels, 1946–1950, Pt. 8, Gibraltar.** Its **M.O.** 555, Pt. 8, pub. **1956.** 36 p. 5 plates, numerous tables, 12 refs. **DWB**—This is the 8th in a series of 18 summaries of upper air data planned for Met. Office (home and overseas) radiosonde stations. The 7 preceding issues cover: 1) Larkhill (5D–209, 4.3–45), 2) Lerwick (5D–209), 3) Habbaniya (5D–209), 4) Malta (5D–209), 5) Aden (6.4–33), 6) Nicosia (6.8–88) and 7) Bahrein (8.6–131). The period of record used is 1946–50, where data are available. Instruments, corrections, number of ascents each month at the various synoptic hours, definitions (e.g., of tropopause) contents of various tables, etc., are reviewed in text. Tables contain mean monthly temperatures and humidities and frequencies of these elements at each level during each month, and at several hours. Monthly frequency resultants and standard vector deviations of wind are also tabulated. Elements are also shown in graphs and wind roses. *Subject Headings:* **1. Upper air data 2. Tropopause data 3. Gibraltar.**—*M.R.*

8.9–126 551.506.7(495)

*Greece. Ethnikē Meteorologike Hyperesia, **Upper air observations for Athens Radiosonde Station: summaries of radiosonde observations of temperature and humidity at standard pressure levels, 1948.** issued Jan. **1956.** 121 p. almost entirely tables. **DWB**—This is the first of a series to be issued in 1956 and 1957 covering all of the years from 1948 on. During 1948 the American AN/AMQ-1 radiosonde was used with AN/FMQ-1 radiosonde receiver and SCR-658 direction finder. Pressure, temperature, humidity, wind direction and speed, height and pressure temperature and height of tropopause are given in conventional units for standard pressure surfaces to 60 mb (where available) for each day of the year and averages for each month and for the year. Average tropopause height varies from 9146 m in Feb. to >15 km in July and August. *Subject Headings:* **1. Radiosonde data 2. Aerological yearbooks 3. Upper air data 4. Tropopause data 5. Athens, Greece.**—*M.R.*

INSTRUMENT CARRIERS

See also: **Insolation of upper atmos. and satellites** (Gast), 8.9–68; **Satellite obs. for upper atmos. res.** (Kallman, Kellogg), 8.9–69; **Satellite pressure and density measurement** (Sicinski et al.), 8.9–70; **Satellite obs.,** 8.9–71; **Air and sea surface temps. at stations I and J** (Kay), 8.9–79.

8.9–127 551.507.1:551.588.2

Schaefer, Vincent J. (*Munitalp Foundation, Inc.*), **Atmospheric studies from a moving eather observatory.** *American Meteorological Society, Bulletin,* 38(3):124–129, March **1957.** igs., table, 5 refs. **DWB, DLC.** Also issued in reprint as *Munitalp Foundation, Inc., N. Y., casional Papers,* No. 0026, **1957.**—A mobile weather station built for making topoclimato-gical temperature and humidity measurements in forests or mountains, was used during Aug. –25, 1955 to obtain temperature and dew point observations at 16 stations on Gisborne ountain (2200 to 5400 ft elev) in the Priest River region of N. Idaho. The observatory and uipment designed by the Univ. of Washington (PHIL E. CHURCH) and the U. S. Forest rvice, with help from the Munitalp Foundation, is described and illustrated. Records, traction of data, atmospheric conditions and results are discussed. Diurnal variations in mperature and dew point on the mountain slopes are shown in tables and charts. Inversions evail at night, and steep lapses in the daytime. Moisture tends to be carried downward by wnslope night winds and dry air replaces it on high slopes. Forest relations are discussed d future projects outlined. *Subject Headings:* **1. Mobile weather stations 2. Mountain icrometeorology 3. Topoclimatology 4. Gisborne Mountain, Idaho.** –*M.R.*

8.9–128 551.507.321.4:551.554

†Saha, K. R. (*Indian Air Force Station, Ambala*), **The aerodynamic resistance of tethered lloons.** *Indian Journal of Meteorology and Geophysics,* 7(3):241–252, July **1956.** 6 figs., tables, 20 refs., 4 eqs. **DWB**—This is a longer version of the report by the author published **Science and Culture** (*see* 6.8–92, Aug. 1955, *MAB*), giving detailed results of the field periments made over flat land near Ambala Airport between Jan. and May 1954. The story of studies of the aerodynamics of spheres from EIFFEL (1912) to date, is reviewed and any references cited. Values of the coefficients of aerodynamic resistance of tethered lloons are calculated and the original data presented and analyzed for 94 of the ascents made th different free-lifts, wind speeds, angles and turbulence conditions. Results are reduced curves for 6 different free lifts (18 to 750 g.) and angles versus wind speed, and coefficients resistance versus Re numbers and a comparison is made with results of other authors using ely rising pilot balloons or falling spheres. Errors and sources thereof, methods used, etc., e treated fully. *Subject Headings:* **1. Captive balloons 2. Aerodynamic properties of balloons Drag coefficient of balloons 4. Ambala Airport, India.**—*M.R.*

8.9–129 551.507.321.4:551.554

Saha, K. R. (*Indian Air Force Station, Ambala*), **The application of the theory of tethered lloons to measurement of low level winds.** *Indian Journal of Meteorology and Geophysics,* elhi, 7(4):353–362, Oct. **1956.** 7 figs., 10 refs., 7 eqs. **DWB, DLC**—A theory of tethered lloons advanced by the author earlier (Saha 1956, *see* 8.9–128) for the determination of rodynamic resistance is developed and applied to the measurement of low level winds up to average height of about 350 ft above the ground. The effect of the supporting thread is scussed in detail and the difficulty of taking the effect of the aerodynamic resistance of the read in a variable wind distribution into a consistent theory is pointed out. An approximate lution is offered by assuming that the total resistance of the thread is the sum of the resistances every 100 ft of the length released in a prevailing wind distribution. Certain assumptions e also made in regard to sag angle, the shape of the thread, the air density, the free lift and the ameter of the balloon, etc. Winds computed from data of tethered balloon flights in ac-rdance with the present method are compared with the results of pilot balloon flights taken most simultaneously. Agreement is found to be fairly close and satisfactory. Divergence a few cases may be due to the fact that in a turbulent atmosphere a tiny pilot balloon like e one used in the present experiments for its low rate of ascent cannot maintain its uniform

rate of ascent as assumed and is liable to yield winds that are not quite dependable. *Subject Headings:* **1. Captive balloons 2. Low level wind measurement.**—*Author's abstract.*

INSTRUMENTS

See also: **Dust beakers** (Teichert), 8.9–156; **Polarimetry** (Cialdea), 8.9–314.

8.9–130 551.508.2:551.521.61

†Matzke, H., **Über die Eignung von NTC-Widerständen bei geophysikalischen Messungen, dargestellt am Beispiel eines Infrarot-Bilanzmessers.** [The utilization of NTC resistances for geophysical measurements, with the example of an infrared balance meter.] *Zeitschrift für Meteorologie*, 10(12):363–369, Dec. **1956.** 8 figs., 50 refs. **DLC**—In recent years the NTC (negative temperature coefficient) resistance (thermistor) has spread rapidly, including use in geophysics, meteorology and hydrology. As an example, wiring diagram for an infrared balance meter is shown, containing 4 NTC resistances behind polyethylene windows. Examples of record and calibration are shown. *Subject Headings:* **1. Thermistors 2. Infrared radiation instruments.**—*C.E.P.B.*

8.9–131 551.508.43:551.543

Sandig, H. U. (*Frankfurt/Main*), **Untersuchung des Askania-Mikrobarometers.** [Examination of the Askania microbarometer.] *Akademie der Wissenschaften, Munich. Deutsche Geodätische Kommission, Veröffentlichungen, Reihe A, Allgemeine Geodäsie*, No. 10b:49–56, **1955.** 2 figs., table. Marzahn, K. and Behrendt, W. (*Munich*), **Über Höhenmessungen mit dem Askania-Mikrobarometer Gb 5, Nr. 5 112 427.** [Altitude measurements with the Askania microbarometer Gb 5, No. 5 112 427.] *Ibid.*, p. 57–63. fig. Graf, A. (*Lochham*), **Über die Verwendung von Mibrobarographen zur barometrischen Höhenmessung.** [Use of the microbarograph in barometric altitude measurements.] *Ibid.*, p. 65–79. 12 figs. (incl. photos), 6 tables, 2 refs. **DWB**—High accuracy of the Askania microbarometer cannot be fully utilized in barometric height measurements due to sudden atmospheric pressure changes. Observational improvements are suggested. Instrumental errors, as zero displacement, lag, scale value, temperature correction, etc. are investigated. In the paper by Marzahan and Behrendt, control measurements were made over 40 m height differences in order to check the practical accuracy of the instrument, which was found in the order of 0.5–0.6 m. In the article by Graf, higher accuracy in barometric height measurements can be achieved by the use of a stationary microbarograph. Errors and best suitable methods are outlined. *Subject Headings:* **1. Barometric levelling 2. Microbarometers 3. Microbarographs 4. Askania microbarometer. I. Marzahn, K. II. Behrendt, W. III. Graf, A.**—*A.A.*

8.9–132 551.508.53/4

Hartley, G. E. W., **Wind recording apparatus for the new Ballistic Range at Shoeburyness.** *Great Britain. Meteorological Research Committee, M.R. Papers*, 1010, 23 Oct. **1956.** 3 p. 6 figs. mimeo. **DWB**—It was required to measure head and side wind components along a 3000 ft trajectory. Five wind transmitters of windmill type, kept into wind by vertical fins, were mounted on 30 ft towers. Recording apparatus, in a hut at the base, included a run-of-wind recorder and wind direction component recorder; chart speed was 6″ per min. *Subject Heading:* **1. Windmill recorders.**—*C.E.P.B.*

8.9–133 551.508.54

Poornachandra Rao, C. (*Met. Office, Poona*), **Thermistor anemometer.** *Indian Journal of Meteorology and Geophysics*, 7(3):321–322, July **1956.** 2 figs., ref. **DWB**—Thermistors (F and M type) suitable for measuring light, moderate and strong winds are tested, using varying resistances and hence temperatures (of the thermistors) and current. All types of arrangements and thermistors are sensitive for wind speeds of 0–6 mph but the F 2311/300 is the best. For 10–20 mph the sensitivities are all only fair. By keeping the beads hot and allowing a "cold" current from a coil to float on the "hot" beads, a better response is obtained at higher wind speeds than by other arrangements. *Subject Heading:* **1. Thermistor anemometers.**—*M.R.*

8.9–134 551.508.59:551.551.25

Jones, J. I. P. and Butler, H. E., **Studies of eddy structure in the first few thousand feet of the atmosphere, Pt. 1, Measurements of the vertical and horizontal (longitudinal) components.** *Porton, England. Chemical Defence Experimental Establishment, Porton Technical Paper* No. 574, **1957.** 9 p. 18 figs., 2 refs. **DWB**—Improved electrical recording instruments for measuring fluctuations of wind inclination, fluctuations of total wind speed, and mean air temperature are described and illustrated. They are attached to a balloon cable; movements of the balloon are measured by recording theodolite. Records at several heights up to 7000 ft at Cardington are reproduced. *Subject Heading:* **1. Wind inclinometers.**—*C.E.P.B.*

8.9–135 551.508.71:551.571.4

Elnesr, Mustafa K. (*Lab. de Physique de l'Atmosphere*), **Appareil pour le mesure directe des gradients de l'humidité.** [Apparatus for direct measurement of humidity gradients.] *Journal Scientifique de la Météorologie*, Paris, 7(25):197–205, Jan./March **1955.** 4 figs., 4 tables, 3 refs., 9 eqs. English and Spanish summaries p. 197. **DWB** ·Detailed description of apparatus for direct measurement of mixing ratio gradient near the ground, using thermocouples for measuring dry and wet bulb temperature gradients, and having a circuit conforming with the wet bulb equation. Circuits, theory (formula), accuracy (4% between 5° and 20°C), construction, radiation error, error due to electrochemical effects on soldered joints, ventilation error, choice of galvanometers, size of junctions and size of muslin; and finally results of 8 actual field tests are presented. Average gradient 1.09±.05 g/kg from apparatus and 1.10 ±0.05 from calculations. Greatest error 0.06 g/kg. *Subject Headings:* **1. Humidity gradient measurement 2. Humidity recorders 3. Humidity gradient calculations.**—*M.R.*

8.9–136 551.508.822:551.547

Bessemoulin, J. (*Ing. en chef de la Mét.*), **Erreurs introduites par l'inexactitude de la radiosonde sur le calcul de l'altitude d'une surface isobare.** [Errors introduced by the inaccuracy of radiosondes in the calculation of the height of an isobaric surface.] *La Météorologie*, Paris, Ser. 4, No. 41:21–27, Jan./March **1956.** 2 refs., 5 eqs. English and Spanish summaries p. 21. **DWB**—The author shows that the precision of temperature measurement by the radiosonde is more important than the precision of pressure measurement. The nature and possible magnitude of the individual constituents of the geopotential equation, namely pressure, temperature and humidity are examined and computation of different errors is carried out and the degree of precision of measurement associated with errors of varying magnitude is determined. *Subject Headings:* **1. Radiosonde errors 2. Isobaric surfaces.** —*I.L.D.*

8.9–137 551.508.822

Bindon, H. H. (*Met. Div. Canada*), **A proposed temperature element on the Canadian radiosonde.** *American Meteorological Society, Bulletin*, 37(6):276–279, June **1956.** 3 figs., 6 refs. **DWB**—After discussing the difficulties involved in constructing a temperature sensing element in a radiosonde giving a true reading of the ambient temperature during daytime ascents, and the various attempts made to assess the magnitude of the radiation error on shielded sondes, the author describes the construction and theory of self-compensating temperature element for radiosondes. This consists of two exactly similar bimetal elements, one of which is silver plated and the other blackened. When mounted to receive equal radiation and ventilation the two elements record the ambient temperature to a probable accuracy of ±0.5°C. Data on temperature from experimental radiosonde ascents and a diagram showing the mounting of the elements are presented. *Subject Headings:* **1. Canadian radiosondes 2. Radiation errors of radiosondes.**—*I.L.D.*

8.9–138 551.508.822:551.501:551.571

Sokolov, S. I., **O vychislenii vlazhnosti vozdukha pri radiozondirovanii atmosfery.** [Calculation of atmospheric humidity by radiosonding of the atmosphere.] *Meteorologiia i Gidrologiia*, Leningrad, No. 6:48–49, Nov./Dec. **1955.** table. **DWB, DLC**—A method is proposed for measuring the atmospheric humidity from the data of radiosonde signals even

when the difference between the simultaneous recording of the radiosonde hygrometer an psychrometer is greater than 10% relative humidity and as much as 25–30% relative humidit or more. The structural factors in radiosondes responsible for the fact that they record higher relative humidity than psychrometers are analyzed. By means of an experimen involving five radiosondes, by means of which relative humidity was measured when the latte showed maximum and minimum differences between radiosonde and psychrometer, it i shown that a correction expressed in millimeters of the ordinates of the scale retains its valu for all values of humidity. *Subject Headings:* **1. Humidity measurement techniques 2. Radio sonde observations.**—*I.L.D.*

SYNOPTIC ANALYSIS AND FORECASTING

See also: **Course in applied aerology** (Vialar), 8.9–20; **Storm warning serv., Germany** (Roediger), 8.9–45; **National Hurricane Research Project** (U. S. W. B.), 8.9–46; **Hurricane warning serv.**, 8.9–47; **Grady Norton, expert on hurricanes** (Kobler), 8.9–67; **Ice forecasting, Arctic** (U. S. Hydrographic Off.), 8.9–89; **Atmos. stagnation forecasts** (Kleinsasser), 8.9–155; **Synoptic situations** (Grünewald), 8.9–173; **Hail forecasting** (Jacobson), 8.9–175; **Forecasting instability areas** (Galway), 8.9–179; **Precip. forecasting** (Drozdov), 8.9–259; **Snowfall forecasting** (Ishiyama, Sato), 8.9–267.

8.9–139 551.509.31

Koo, Chen-Chao, **Opredelenie estestvennogo sinopticheskogo raĭona severnogo polusharii po obmenu tepla mezhdu materikom i okeanom.** [Determination of natural synoptic region of the Northern Hemisphere from the heat exchange between the continents and the oceans. *Acta Meteorologica Sinica*, Peking, 26(1/2):65–69, **1955.** 26 figs., 5 refs. At head of article Ku Chzhen Chau. In Chinese; Russian summary p. 69. **DLC** (Orientalia)—The Norther Hemisphere is divided into a number of "Natural Synoptic Regions" in mid-latitudes, base on the distribution of hot and cold source regions (i.e., continents, oceans, mountain range and exposure to continental or oceanic circulation in the middle latitudes). The work is a extension of the "Natural Synoptic Period" school work of POGOSIAN, PAGAVA et al. *Subje Headings:* **1. Natural synoptic regions 2. Natural synoptic periods.**—*M.R.*

8.9–140 551.509:681.1

Fletcher, Robert D. (*Pres. A.M.S.*), **Two outstanding problems of modern meteorology** *American Meteorological Society, Bulletin*, 37(9):473–476, Nov. **1956. DWB, DLC**—The tw problems which the newly elected president of the Amer. Met. Soc. considers the most im portant for the immediate future of meteorology are: 1) the better interpretation of forecasts research and climatological analyses to the user (examples of the latter are cited) and 2) makin better use of the elaborate machines and techniques now available to the meteorologists s they can improve the product. The objective or the numerical forecast should be the "wors possible" forecast which the competent forecaster should use as a basis for subjective improve ment although the inexperienced forecaster will need to use it with little or no alteration *Subject Headings:* **1. Forecast interpretation 2. Objective techniques 3. Machine methods** —*M.R.*

8.9–141 551.509.1:621.3

Hall, William Ferguson and Holloway, Leith (*both, Systems Analysis Section, U. S. W. B Wash., D. C.*), **Reduction of error in weather communication systems.** U. S. Weather Bureau Wash., D. C., July **1956.** 27 p. fig., 6 tables, 2 refs. **DWB**—A system is proposed whic would introduce check sequences into meteorological telecommunication messages. Thes check sequences would be produced by an automatic "check encoder" at each transmittin site and analyzed by a "reconciler" at the receiving points. Both devices (yet to be designed would essentially consist of a battery of telephone-type relays and a tape punching mechanism they could be used with present teleprinters. By this system errors originating in telecom munication lines would be either indicated or corrected. Possibilities of correcting huma errors are also discussed. *Subject Headings:* **1. Telecommunication 2. Weather data trans mission errors 3. Forecast improvement.**—*G.T.*

8.9–142 551.509.1:621.398

Myers, R. F. (*U. S. W. B., Oak Ridge, Tenn.*), **A weather information telemeter system.** *American Meteorological Society, Bulletin*, 37(3):108–117, March **1956.** 13 figs. (incl. photos), table, 4 refs. **DWB**—With the aid of numerous photographs and diagrams the author describes the design, construction and operation of a 90-channel data system which can print directly on a teletype the digital values of temperature, precipitation, wind duration and velocity, dewpoint and vertical temperature gradient. Scheduled sequence, manual selection of individual stations or elements or continuous printing of a selected station have been incorporated into the design. *Subject Headings:* **1. Telemetering systems 2. Weather forecasting.**—*I.L.D.*

8.9–143 551.509.21:551.54(263.5)

Kasparbauer, Walter, **Synoptische Luftdruckbeobachtungen im Karibischen Raum und ihre Fehler.** [Synoptic pressure observations in the Caribbean region and their errors.] *Meteorologische Rundschau*, 10(2):52–53, March/April **1957.** 2 figs. **DWB**—Mean pressures are plotted for May–June 1956 for Central America and West Indies, and isobars drawn. Only 3 stations did not fit. Daily figures showed that almost all important maxima and minima occurred simultaneously over the whole region. *Subject Headings:* **1. Synoptic chart accuracy 2. Caribbean.**—*C.E.P.B.*

8.9–144 551.509.2/3 551.582.1(882)

§Delourme, A., **De la circulation atmosphérique et de l'influence de l'air polaire dans les régions intertropicales de l'Atlantique.** [Atmospheric circulation and the influence of polar air in the intertropical regions of the Atlantic.] *France. Météorologie Nationale, Mémoriale*, No. 41, **1956.** 47 p. 49 figs. **DWB**—The fragmentary and often inaccurate observations (climatic, synoptic and upper air) available for the sub-tropical and inter-tropical regions of the Atlantic between South America and Africa, are analyzed and synthesized to produce a systematic picture of the seasonal, diurnal, air-mass and spatial variations in meteorological elements (rainfall, temperature, wind, thunderstorms, clouds, fog, freezing level, ceilings, visibility) that are of interest to activities (especially aviation) in French Guiana and similar intertropical regions of the Atlantic. In the Introduction, the meteorology, climate, topography and pressure regime in French Guiana are treated. Pt. I takes up the general circulation in the tropical regions from 20° to 70°W; Pt. II, air masses, (their origin, paths, characteristics, weather types and disturbances, etc.); Pt. III, analysis of typical situations (April 12, 1953) (Dec. 6–14, 1952) (Feb. 4–12, 1953); and Pt. IV, forecasts and reports for aviation. Cross sections, diagrams, soundings, synoptic charts and schematic diagrams abound. *Subject Headings:* **1. Synoptic meteorology of tropical Atlantic 2. Climate of French Guiana 3. Intertropical convergence zone 4. French Guiana 5. Tropical Atlantic.**—*M.R.*

8.9–145 551.509.323:551.501.6:518.3

Kopáček, Jaroslav, **Grafický výpočet noční minimální teploty.** [Graphical computation of nocturnal minimum temperature.] *Meteorologické Zpravy*, Prague, 9(5/6):134–141, **1956.** 5 figs., 3 tables, 5 refs., 7 eqs. Russian and German summaries p. 134. **DWB**—The applicability of Brunt's formula is considerably extended by introducing the factor R_N which takes account of any given cloud height and amount of cloudiness, even if there are several cloud layers. For easier computation several nomograms were constructed (and are presented) which replace all calculation. Using these nomograms minimum temperatures were computed for Hradec Kralové for April and May 1954. In 93% of all cases the error was less than 3°C; in 69% it was less than 1.5°C. *Subject Headings:* **1. Minimum temperature forecasting 2. Nomograms 3. Hradec Kralové, Czechoslovakia.**—*Trans. of author's abstract.*

8.9–146 551.509.323:551.571

Kozma, Ferenc, **A harmatpont és a helyi fagyelőrejelzések.** [Dewpoint and local frost forecasting.] *Időjárás*, Budapest, 60(3):159–167, May/June **1956.** 8 figs., 2 tables, 3 refs., eqs. Russian and German summaries p. 159. Russian trans. p. XVII–XXIII. **DLC**—Minimum temperature data obtained at ten micrometeorological stations at the Martonvásár Agricultural Research Institute are tabulated (May 17–26 and Oct. 12–21, 1955). Local

differences are found to be considerable (frequently 4–5°C between two stations, in one case more than 6°C). An analysis of the data from a point of view of frost forecasting by means of the dewpoint method reveals this method to be inadequate (it is partly based on wrong assumptions, disregards such factors as cloudiness, wind, state of the soil, etc., and is subject to error due to the fact that surface minimum temperature is predicted from dewpoint measured 2 m above the ground). A preliminary analysis of the data is also made in respect of Berliand's method of frost forecasting, with promising results. Investigation of this and of other methods is being continued. *Subject Headings:* **1. Minimum temperature forecasting 2 Dew point.** —*G.T.*

8.9–147 551.509 3

McMurray, William M. (*Nat. Weather Records Center, U. S. W. B., Asheville, N. C.*), **Data collection for the Northern Hemisphere map series.** *Monthly Weather Review*, Wash., D. C., 84(6):219–234, June **1956.** 17 figs., 4 refs. **DWB, DLC**—About 1100 synoptic reports are normally plotted on daily sea level historical maps and 330 radiosonde and 60 pibal reports on the 500 mb charts. This represents about 40% of the available surface reports and 94% of 500 mb reports. The various sources of data are indicated and coverage for each type shown on large Northern Hemisphere charts. These are: 1) original records and punched, cards (U. S. and possessions and weather ships), 2) code sheets from 40–50 foreign countries 3) data publications (Germany, United Kingdom, India, Japan), 4) teletype transmissions (direct), and 5) teletype reports intercepted from radio transmissions, etc. (U.S.S.R.). The present series covers only 10 months of each year. Status of completion and planning for surface and upper air series (1899–1956) are indicated year by year from 1939 to date. Work is now done at Asheville, N. Carolina. *Subject Headings:* **1. Northern Hemisphere daily map series 2. Synoptic data collection 3. Asheville, N. Carolina.**—*M.R.*

8.9–148 551.509.33:551.524.3:551.577.3

Gabilly, A., **Prévision météorologique a longue échéance.** [Long range weather forecasting.] *La Météorologie*, Paris, Ser. 4, No. 43:171–189, July/Sept. **1956.** 12 figs., 2 tables, 3 refs. English and Spanish summaries p. 171–172. **DWB**—Previous long range forecast studies have been based on monthly mean anomaly charts; the present work uses a six-monthly period (i.e., Dec.–Jan.—Nov.–Dec.) and is supported by a climatological study of the movement of the bi-monthly mean centers of annual + or − pressure anomalies (using Dec. 1949–Dec. 1954 data) for the Northern Hemisphere (except Asia). The progressive movement of these centers is sometimes regular and persistent enough to give an advantage over chance or climatology. Tests were made of forecast skill compared with persistence, and for France (broken down by subregions) for forecasts of temperature and precipitation anomalies for 2-month periods. The statistical verification seems to show some skill. Each situation (and its development) during the 5-year period is described in some detail and verification shown graphically, as well as in tables. *Subject Headings:* **1. Long range temperature forecasting 2. Long range precipitation forecasting 3. Bi-monthly pressure anomaly charts 4. France.** —*M.R.*

ARTIFICIAL PRECIPITATION

See: **Cloud seeding effects** (Ives), 8.9–290.

STRUCTURE AND PHYSICS OF THE ATMOSPHERE

COMPOSITION OF THE ATMOSPHERE

See also: **Atmospheric gases** (Ghosh, Edwards), 8.9–27; **Satellite density measurement** (Sicinski et al.), 8.9–70.

8.9–149 551.510.41:551.578.11

Junge, Christian E. and Gustafson, Philip E. (*U. S. A. F., Geophysics Research Directorate, Cambridge, Mass.*), **Precipitation sampling for chemical analysis.** *American Meteorological*

Society, Bulletin, 37(5):244, May 1956. fig. **DWB**—A network of 67 U. S. W. B. stations in the U. S. A. (including Air Weather Service Stations in Bermuda, Azores, and Newfoundland and Coast Guard ships at ocean stations Coca, Delta and Echo) collected samples of rainfall in polyethylene bottles (with plexiglass funnels) for chemical analysis by Geophysics Research Directorate. Analyses of average monthly concentration of NH_4, NO_2, Cl, Na, K, Cr, Mg and SO_3 ions were made to determine geographic and seasonal distribution of these elements in rainwater. A map of U. S. A. shows isarithms of Cl ion concentration in Aug. 1955. Highest value was 18.5 mg/l at Hatteras. A value of <0.15 occurred over $\frac{3}{4}$ of the country. *Subject Headings:* **1. Chemical composition of rainwater 2. Rainfall analysis 3. Chlorinity of rainwater 4. United States.**—*M.R.*

8.9–150 551.510.41:546.214:523.78

Bezverkhniĭ, Sh A.; Osherovich, A. L. and Rodionov, S. F., **Elektrofotometricheskie issledovaniia atmosfernogo ozona vo vremia zatmeniĭ solntsa 25 II 1952 g. i 30 VI 1954 g.** [Electrophotometric investigations of atmospheric ozone during the solar eclipses of Feb. 25, 1952 and June 30, 1954.] *Akademiia Nauk SSSR, Doklady*, 106(4):651–654, Feb. 1, 1956. 3 figs., 13 refs., 3 eqs. **DWB, DLC**—At a series of stations, whose coordinates are given, the ultraradiation of the sun and the atmospheric ozone during an eclipse were investigated with integral laboratory photometer with antimony-cesium photoelements and photointensifier. Ozone measurements, presented graphically, indicate an increase in ozone amount during full eclipse but that the ion-periodic ozone variations are fundamentally the result of meteorological factors in the atmosphere. *Subject Headings:* **1. Electrophotometric observations 2. Ozone measurement during eclipses 3. Ozone measurements.**—*I.L.D.*

8.9–151 551.510.41:551.21:551.521.1

*Enger, I. and Fritz, S. (*both, U. S. W. B., Wash., D. C.*), **Opacity of the sky after July 1953.** *Monthly Weather Review*, Wash., D. C., 84(8):301–304, Aug. 1956. 2 figs., 3 tables, 8 refs. **DWB, DLC**—Following the eruption of a cone on Mt. Spurr, 80 mi west of Anchorage, Alaska, on July 9, 1953, decreases in solar radiation were noted at a number of stations in widely separated parts of the N. Hemisphere (Japan (4 stations); Athens; Uccle, Belgium; Lincoln, Nebr.; Blue Hill, Mass.; Table Mountain, Calif.). The averages of clear sky solar radiation intensity (% of normal) are given in tables and graphs for each month from 1950–1954. Smoothed 6 month averages for Oct. 1953–March 1954 were significantly below normal at all stations and were the lowest in 30 years at some places. The Fisher test for combined probabilities gives a chance of <1 in 10,000 that such low radiation would occur by chance at such widely separated places. No such general decrease occurred after any H bomb tests. *Subject Headings:* **1. Volcanic dust effects on solar radiation 2. Mt. Spurr, Alaska.**—*M.R.*

ATMOSPHERIC POLLUTION

See also: **Aerosol size distribution** (Dietze), 8.9–315.

8.9–152 551.510.42

Fortak, H., **Staubtransporte über staubaktiver Erdoberfläche.** [Dust transport over dusty surfaces.] *Zeitschrift für Meteorologie*, 11(1):19–27, Jan. 1957. 4 figs., 7 refs., 46 eqs. **DLC**—The equation of number of dust particles per unit volume is set out and solved, in general and for various boundary conditions. *Subject Heading:* **1. Dust transport.**—*C.E.P.B.*

8.9–153 551.510.42 628.53

Foxwell, G. E., **Smoke abatement in practice.** *Smokeless Air*, 94:219–227, Summer 1955. 6 refs. **DWB**—The problems raised by the recommendations of the British Committee on Air Pollution are discussed. Industrial smoke can be greatly reduced by modernizing plant and keeping it in order. Railways should be converted to diesel engines or electrified. Domestic fires are more difficult and "black" areas should be attacked first, by smokeless fuels and more efficient use of coal. Difficulties are discussed. Organization of smokeless zones is described. *Subject Heading:* **1. Smoke abatement.**—*C.E.P.B.*

8.9–154 551.510.42

Hewson, E. Wendell (*Prof. Met., Mich. Univ.*), **Meteorological problems.** *U. S. Public Health Service, Public Health Reports*, 70(7):642–644, July **1955. DLC**—A general discussion of the problem of air pollution and its relation to meteorological factors. Two kinds of pollution are recognized: natural, and artificial. Wind, turbulence, rainfall and solar radiation as well as stability of the atmosphere affect local concentrations, while dispersal far from the source may be affected by the general circulation. Pollution from multiple sources makes the problem even more complicated (e.g., in Los Angeles or Leicester area). The author recommends development of a climatic classification dependent on diffusive powers of the atmosphere and other studies. *Subject Headings:* **1. Atmospheric pollution 2. Weather effects on atmospheric pollution.**—*M.R.*

8.9–155 551.510.42:551.509.58

§Kleinsasser, T. W. (*U. S. W. B., Airport Station, Knoxville, Tenn.*) and Wanta, R. C. (*U. S. W. B., Res. Sta. Cincinnati, Ohio*), **The development of a forecasting service for use in air pollution control.** *Air Pollution Control Association, Journal*, 6(4):228–232, Feb. **1957.** 4 figs., 8 refs. **DWB, DLC**—History of TVA steam plants at Kingston, Tenn., where 4,300,000 tons of coal are consumed annually; effects of weather on dispersion of stack gases (wind, stability, relative humidity and fog); local weather during short periods of atmospheric stagnation in July–Oct. 1954, a stagnation "model," the stagnation forecast and warning (advisories and alerts) service, extreme local stagnation warnings and criteria, frequency of stagnation alerts (2–3 times a year) and, finally, a case study (Oct. 22–26, 1954) are discussed and illustrated with synoptic charts, wind and wind aloft graphs and data. *Subject Headings:* **1. Atmospheric pollution control 2. Atmospheric stagnation forecasts 3. Kingston, Tenn.**—*M.R.*

8.9–156 551.510.42(43):551.508.91

Teichert, F., **Ergebnisse einer regionalen Staubuntersuchung mit Hilfe von Staubbechern.** [Results of a regional dust investigation with dust beakers.] *Zeitschrift für Meteorologie*, 10(12):369–373, Dec. **1956.** 4 figs., 4 refs. **DLC**—Beakers (author decided against a streamlined outer vessel) with porous bases to permit outflow of rainwater were exposed from April 1–Oct. 1, 1956 at 50 stations in Germany. Collecting surface 17.65 cm^2; amounts collected ranges from 2 mg at Brocken to 435.8 mg at Riesa. *Subject Headings:* **1. Atmospheric pollution studies 2. Atmospheric pollution instruments.**—*C.E.P.B.*

UPPER ATMOSPHERE—IONOSPHERE

See also: **Radiative properties of stratosphere** (London et al.), 8.9–187; **Ionospheric winds** (Shuleĭkin, Korneva), 8.9–236; **Eclipse effects on ionosphere** (Dominici), 8.9–307; special bibliography on **Propagation of Radio Waves through the Troposphere, p. 1243.**

8.9–157 551.510.52:551.557

†Lamb, H. H., **Some interesting properties of the "nullschicht" or maximum-wind layer.** *Meteorological Magazine*, London, 86(1019):142–145, May **1957.** fig., 14 refs. **DWB**—A summary of recent literature, mainly German. The "Nullschicht" (zero layer) is the level, about 1 km below tropopause, where vertical motion is approximately zero; it is the level of the maximum wind layer. Where there is a well defined maximum in vertical distribution, it is above gradient strength, and on average ageostrophic flow is towards higher pressure. This is attributed to building up of kinetic energy just below tropopause because convection carries more energy upwards in depressions than downwards in anticyclones. *Subject Headings:* **1. Tropospheric structure 2. Zero layer (Nullschicht) 3. Upper air winds.**—*C.E.P.B.*

8.9–158 551.510.535:535.51:551.594.7

Bain, W. C. and Glass, C. B. I., **The polarization of very long radio waves reflected from the ionosphere at oblique incidence.** *Institution of Electrical Engineers, London, Proceedings, Part C*, 103(4):447–448, Sept. **1956.** table, ref., 2 eqs. **DLC**—A study of some additional evidence has been made to determine the polarization of radio waves reflected from the iono-

sphere at 16 kc/s over a transmission path 540 km long. The ratio between the amplitudes of the vertical and horizontal electric fields is found to be appreciably greater than unity, the mean value of the determinations made here being 5. *Subject Headings:* **1. Ionospheric radio wave polarization 2. Ionospheric electric fields.**—*Authors' abstract.*

8.9–159 621.396.6:551.510.535

Blatt, E. L.; Chaffee, D. D. and Volz, C., **75 Kc/s high power pulse transmitter.** Pennsylvania. State Univ. Ionospheric Research Lab., Contract AF 19(604)-1304, Scientific Report, No. 78, Oct. 30, **1955.** 63 p. 33 figs. (incl. photos), eqs.—This report is essentially an extension of Scientific Report, No. 40 and attempts to describe in some detail the conversion involved in changing the frequency of the Laboratory's high power, long-wave pulse transmitter from 150 kc/s to 75 kc/s. Considerable detail is given with regard to automatic circuitry which has been developed in order that the equipment may be operated continuously without the presence of an operator. The report is concluded with a very brief description of a synchronizing transmitter, operated on a higher frequency, which is utilized to trigger time bases, and other apparatus, at the various remotely located receiving equipments. This permits recording the 75 kc/s ground pulse. *Subject Headings:* **1. Ionospheric research 2. Radio transmitters.**—*Authors' abstract.*

8.9–160 551.510.535

Burkard, O. (*Inst. für Met. und Geophysik, Univ. Graz*), **Eine einheitliche Formel für die morgendliche F_2-Ionisation an europäischen Stationen.** [A universal formula for F_2 ionization in the morning at European stations.] *Geofisica Pura e Applicata*, Milan, 34:207–210, **1956.** 2 figs., table, 3 refs., 2 eqs. German and English summaries, p. 207. **DLC**—The squares of critical frequencies $(f,F_2)^2$ measured at European stations in the morning of a summer-month may be represented by a formula

$$(f_0F_2)^2 = K \cdot \left(\frac{\cos \chi}{\cos^2 \varphi} \right)^2 \cdot \cos^2 \varphi.$$

Herein χ is the zenithangle of the sun, φ the geographical latitude of the ionospheric station. χ depends on locality, but K is independent on it and probably characteristic of intensity of the sun's ionizing radiation. *Subject Heading:* **1. F_2 critical frequency.**—*Author's abstract.*

8.9–161 551.510.535:551.557:551.501.8

Harnischmacher, Ewald and Rawer, Karl, **L'interprétation des observations du vent ionosphérique suivant la méthode des "fadings."** [Interpretation of ionospheric wind observations by the "fading" method.] *Académie des Sciences, Paris, Comptes Rendus*, 243(9):747–750, Aug. 27, **1956.** table, 4 refs. Also their: **Résultats d'observations systématiques du vent ionosphérique dans la région E.** [Results of systematic observations of ionospheric wind in the E region.] *Ibid.*, 243(10):782–783, Sept. 3, **1956. DLC**—Krautkrämer's method of ionospheric wind determination by means of comparison of fadings using three antennas, is found to be more accurate than anticipated on the basis of theory. Regular observations made by this method at Neuf-Brisach between Dec. 1955 and Aug. 1956 show average monthly wind velocities of 60–100 m/s in winter and 40–70 m/s in summer. Wind direction undergoes two complete revolutions in 24 hours on 80% of all days in winter and one revolution at night in summer. *Subject Headings:* **1. Ionospheric wind measurement 2. Ionospheric wind variations.**—*G.T.*

8.9–162 551.510.535:551.557

†Hirono, Motokazu and Kitamura, Tai-ichi (*Geophysical Inst., Kyoto Univ.*), **A dynamo theory in the ionosphere.** *Journal of Geomagnetism and Geoelectricity*, 8(1):9–23, March **1956.** 10 figs., 35 refs., 38 eqs. **DWB**—The differential equations of the dynamo theory are solved by numerical integration, taking into account the daily variation of the anisotropic conductivity. It is shown that the observed wind in the E region is sufficient for the requirement of the dynamo theory. The drift of ionization is discussed and it is shown that at night some

part of electrons in the lower *F* region will descend into the *E* region in the middle latitudes. *Subject Headings:* **1. Dynamo theory of ionosphere 2. Ionospheric winds.**—*Authors' abstract.*

8.9–163 551.510.535:523.7

Kautzleben, H., **Zur Berechnung des Sonnenaufgangs in den Höhen der Ionosphärenschichten.** [Calculation of sunrise at the heights of the ionospheric layers.] *Zeitschrift für Meteorologie*, 10(11):337–341, Nov. **1956.** 5 figs., table, 5 refs., 5 eqs. **DLC**—A nomogram is developed from which can be found the local time of sunrise or sunset at any given height above any given place for any season, and the local time at which the sun is at any given height above the horizon. By this the influence of a protective atmospheric layer which keeps the effective UV radiation from the earth's surface can be shown. *Subject Headings:* **1. Sunrise 2. Ionosphere.**—*Trans. of author's abstract.*

MECHANICS AND THERMODYNAMICS OF THE ATMOSPHERE

See also: **"Diabatic" for "non-adiabatic"** (Fulks), 8.9–63; **Radiation and heat balance** (Lauscher), 8.9–186; **Vertical temp. gradient** (Dobosi), 8.9–195; **Moisture exchange** (Grigor'eva), 8.9–241.

8.9–164 551.511:551.515

Doporto, M., **Meridional transport of angular momentum and sensible heat due to large-scale perturbations of the atmosphere.** *I.U.G.G. Association of Meteorology, Rome, Sept. 1954, Scientific Proceedings.* London, Butterworth, **1956.** p. 444–452. 3 figs., 4 tables, 5 refs., 4 eqs. **DWB**—The Valentia radiowind and radiosonde observations made between 1.10.46 and 30.9.50 reaching at least 16 km. have been classified according to the sign of the pressure variation at 8 km during the preceding 12 hours and average values of the pressure and northwards and eastwards wind components for both groups computed. The result is considered as representative of ascents made at the middle lines between a trough and the following ridge and a ridge and the following trough. From these data the flow of angular momentum and sensible heat per unit time at various levels due to large-scale perturbation of the westerlies are computed. The data are presented in graphs and tables. *Subject Headings:* **1. Meridional heat flux 2. Meridional momentum flux.**—*Author's abstract.*

8.9–165 551.511.13

Dufour, L. (*Inst. Royal Met., Uccle, Belgium*), **Entraînement d'air humide saturé contenant de l'eau liquide dans une masse d'air humide saturé contenant de l'eau liquide.** [Entrainment of saturated moist air containing liquid water in a mass of moist saturated air containing liquid water.] *Tellus*, Stockholm, 8(3):403–407, Aug. **1956.** 3 refs., 42 eqs. **DLC**—In the present work, on the basis of the first principle of thermodynamics, we establish the law of variation of temperature with pressure in a saturated mass sphere containing liquid water into which saturated air containing also liquid water penetrates. Admitting that the considered mass of air and the air which is introduced into it form a closed system, the problem consists in the study of the adiabatic transformations of a polytherm closed system. Owing to a few hypothesis (cf. (24) and (28)), we obtain formula (35) which is a particular case of the formula (36) which leads to the study of the entrainment of nonsaturated air into a cumulus. Taking the example of a bubble which moves in the middle of a cumulus, we show that the rate of variation of temperature with pressure is, to the first approximation, that of the standard adiabatic. *Subject Headings:* **1. Adiabatic processes 2. Saturation adiabat 3. Entrainment in cumulus.**—*Author's abstract.*

8.9–166 551.511.3:551.513.1

Lettau, Heinz, **Theoretical notes on the dynamics of the equatorial atmosphere.** *Beiträge zur Physik der Atmosphäre*, Frankfurt a.M., 29(2):107–122, **1956.** 5 figs., 2 tables, 17 refs., 21 eqs. English and French summaries p. 107–108. **DWB**—The terms of the Navier-Stokes equation, and simplifications which are permissible in the study of the dynamics of the equatorial atmosphere, are investigated. An interesting feature of the present-day empirical concept of the general circulation over the equator is that circumferential rings of oppositely

moving air exist one above the other in the stratosphere. Between the steady east wind zones, near the tropical tropopause and in the upper stratosphere a relatively narrow belt of steady west winds is inserted (Berson westerlies, in the 20 km height range). The dynamics of zonal ring flow between 15 and 40 km over the equator are discussed with the aid of the first equation of mean motion which relates the profiles of wind shear and curvature to vertical motion and eddy viscosity. A plausible solution is derived which shows that the Berson westerlies occupy a zone of minimum values of eddy viscosity and eddy energy transformation rates. It is shown that the lower half of the Berson westerlies represents a geostrophic current which is maintained by adiabatic warming through downward directed mean motion of air. The upper half of this current is "frictionally driven." A general discussion of theoretical relationships between zonal speed, pressure or density gradients, and meridional and vertical motion in the equatorial atmosphere is also presented. *Subject Headings:* **1. Dynamics of the atmosphere 2. Equatorial circulation 3. Equatorial meteorology 4. Berson westerlies.**—*Author's abstract.*

8.9–167 551.511.6:551.513.1

Elliott, Robert D. (*Aerophysics Res. Found., Santa Barbara, Calif.*), **Low latitude vorticity injections and the development of large scale anomalous circulation patterns.** *American Meteorological Society, Bulletin,* 37(6):270–275, June **1956.** 6 figs., 4 refs., 2 eqs. **DWB**—Daily maps of the vertical component of the 500 mb absolute geostrophic vorticity, the 500 mb space means and 500 mb contours for 3 years (1949–51) were compiled from data computed on IBM machines from AROWA's 500 mb Northern Hemisphere deck, and a synoptic-climatological analysis made of the results. Sudden injections of vorticity from high latitudes to low or middle latitudes were found to produce developments downwind, and in the cases of the regions of frequent vorticity injection east of Siberia and Canada the process is considered essential for the maintenance of the semi-permanent Aleutian and Icelandic Lows. Troughs form upwind and blocking ridges, downwind from these injections (which are differentiated from vorticity advection regions where vorticity injections are carried along by the general westerly flow). Composite maps for Pacific (23 cases) and Atlantic (19 cases) show developments during 3 days following an injection. *Subject Headings:* **1. Vorticity injections 2. Synoptic climatology 3. Northern Hemisphere.**—*M.R.*

GENERAL CIRCULATION

See also: **Storm situations, Iceland** (Mertins), 8.9–30; **Circulation and the weather, U. S.** (Klein), 8.9–115; **Dynamics of the equatorial atmos.** (Lettau), 8.9–166; **Vorticity injections** (Elliott), 8.9–167; **Monsoon wind flow patterns** (Kochanski, Wasko), 8.9–234.

8.9–168 551.513.1:551.557.5

Hwang, S. S., **Basic factors determining the main features of the general circulation of the atmosphere.** *Acta Meteorologica Sinica,* Peking, 26(1/2):35–64, **1955.** 17 figs., 43 refs. In Chinese; English summary p. 64. **DLC**—Annual variations in the latitude of the jet stream, the belt of easterlies, the strength of the zonal (westerly) circulation and of the easterlies and their cause (variations in the intensity of solar radiation throughout the year) are discussed and quantitative models presented for each of the elements for the Northern Hemisphere. Next the influence of the continent and oceans on the strength of the circumpolar jet stream is demonstrated. Orographic influences are shown to be important in winter. Lastly, solar relations (cyclical) to the general circulation are treated. *Subject Headings:* **1. General circulation 2. Jet stream variations 3. Solar influences 4. Far East.**—*M.R.*

8.9–169 551.513.1

MacGregor, Pamela A., **Development of the theories of the circulation of the atmosphere over South Africa.** *South African Geographical Journal,* Johannesburg, 37:41–52, Dec. **1955.** fig., 23 refs. **DWB**—A review of the history of the present ideas on the atmospheric circulation over South Africa. The first Meteorological Committee was formed in 1860 at Cape Town. The first work on the theory of S. African climate (and rainfall) was prepared by A. Buchan

in 1896. The first 1*st* order station in the interior was established in 1886 near Kimberly. The Central Meteorological Office was established at Pretoria in 1912. G. W. Cox showed in 1935 that there was little difference in air circulation over S. Africa between summer and winter but most recent writers stick to the old theory of BUCHAN (reversal of winds with seasons). Theories of BROOKS and MIRRLEES (1932) are examined critically. Upper air charts are essential for understanding the circulation and these were not prepared until recently. *Subject Headings:* **1. Atmospheric circulation 2. South Africa.**—*M.R.*

8.9–170 551.513.1:551.547

†§*Teich, Martin, **Beitrag zum Problem der allgemeinen Zirkulation, insbesondere der mitteltroposphärischen Hochdruckgebiet der nördlichen Nordhemisphäre.** [Contribution to the problem of the general circulation, especially of the middle tropospheric high pressure area of the northern part of the Northern Hemisphere.] *Germany. Deutsche Demokratische Republik. Meteorologischer und Hydrologischer Dienst, Abhandlungen*, 5(36), **1955.** 58 p. 76 figs., 70 refs. **DWB**—The middle troposphere high pressure regions of the Northern Hemisphere are studied on the basis of the circumpolar upper weather charts, which have been prepared for the last five years by the West German Weather Service and upon the upper altitude normal weather charts of the U. S. Weather Bureau. Pt. 1 of this study includes the principal characteristics of the normal charts of AT 500 mb, such as annual and monthly normal charts, latitude means of the height of AT 500 mb and of atmospheric pressure and meridional profiles and zonal components of geostrophic wind; zonal index at the 500 mb surface and at sea level; annual and monthly variations of air masses in the Northern Hemisphere and influence of Northern Hemisphere orography upon the general character of the upper level flow at 500 mb. Pt. 2 is a detailed analysis of the middle troposphere high pressure regions during the period 1949–1953. It deals with the manner of origin of the high pressure region; their geographical distribution during the individual months of this period; and middle troposphere high pressure regions of ≥ 5 days persistence; numerous charts and graphs are presented in an appendix. *Subject Headings:* **1. General circulation 2. Upper air pressure 3. Zonal index 4. Northern Hemisphere.**—*I.L.D.*

8.9–171 551.513.2:551.557

†Dzhordzhio, V. A., **Struïnoe techenie.** [Jet stream.] *Meteorologiia i Gidrologiia*, No. 6:49–60, June **1956.** 8 figs., 61 refs., eqs. **DWB, DLC**—In this very comprehensive review of the literature on the jet stream the author discusses the fundamental properties of the relationship of jet streams to the planetary frontal zone aloft, the classification of jet streams, the influence of orography upon jet streams, the dimensions of jet streams and their principal parameters, cloudiness and rainfall associated with jet streams, and jet stream fronts and cyclones. *Subject Heading:* **1. Jet stream.**—*I.L.D.*

8.9–172 551.513.2

Hosler, Charles R. (*Air Weather Service, U. S. A. F.*), **A study of easterly waves in the Gulf of Mexico.** *American Meteorological Society, Bulletin*, 37(3):101–107, March **1956.** 5 tables, 4 refs. **DWB**—Sixty-three easterly waves in the Gulf of Mexico during the period 1946–1954 were analyzed synoptically with respect to their origin, structure, weather distribution, maintenance, displacement, intensification, termination, their effect upon inland weather and their seasonal incidence. Tables giving a summary of weather data of Brownsville, Tex. relative to easterly wave passage at this station, data on the structure and weather distribution of the easterly waves, displacement data and seasonal incidence are presented. *Subject Headings:* **1. Easterly waves 2. Gulf of Mexico.**—*I.L.D.*

8.9–173 551.513.7:551.509.318

§Grünewald, Günter, **Allgemeine Betrachtungen über die mitteltroposphärische Zirkulation der Nordhemisphäre im Hinblick auf europäische Witterungsumstellungen.** [General considerations on the middle tropospheric circulation of the Northern Hemisphere from the standpoint of European weather changes.] *Germany. Deutsche Demokratische Republik. Meteorologischer und Hydrologischer Dienst, Abhandlungen*, 4(29), **1955.** 61 p. 26 figs., 17 charts (fold.), 27 refs. **DWB, DLC**—An attempt is made to examine hemispheric relation-

ships of the large scale circulation upon European weather and weather changes by analyzing the absolute topography. The first section presents a general survey of the hemispheric circulation and the principal circulation centers are taken to be both cold poles in the polar dome and the individual high pressure cells in the horse latitudes. The hemispheric distribution of highs and lows during the winters and summers 1949/50, 1950/51, 1951/52, 1952/53, and 1949, 1950, 1951, 1952 respectively and during the Jan. and July months of 1949–1953 are analyzed. The effect of the cellular structure of the horse latitudes upon the circulation and the west wind zone as a carrier of air mass exchange are discussed and a comparison is made between the atmospheric circulation and ocean currents. Section 2 deals with the circulation conditions that influence Europe directly, namely the warm air flow from cells in the horse latitudes. Section 3 contains detailed analyses of individual circulation processes including the origin and displacement of the North American trough, the cold air outbreaks from the polar dome across Davis Strait towards the Atlantic and the influence of the polar high low centers upon the circulation; and Section 4 is concerned with the temporal sequence of Northern Hemisphere large scale circulation forms, such as the annual distribution of the eccentric deep core situation and central polar steering, of ridges aloft from the Pacific, etc. The study contains numerous synoptic charts in the text and a supplement of plates. *Subject Headings:* **1. Atmospheric circulation anomalies 2. Synoptic situations.**—*I.L.D.*

ATMOSPHERIC DISTURBANCES

See also: **Air masses and fronts** (Bleeker, Van Duijnen Montijn), 8.9–3; **Cold fronts, Australia** (Berson et al.), 8.9–22; **Cyclone and anticyclone frequencies, N. Hemisphere** (Klein), 8.9–29; **Storm situations, Iceland** (Mertins), 8.9–30; **National Hurricane Res. Project** (U. S. W. B.), 8.9–46; **Hurricane warning serv.,** 8.9–47; **Grady Norton, expert on hurricanes** (Kobler), 8.9–67; **Radar tornado detection** (Bigler), 8.9–118; **Radar tornado detection** (Brokaw), 8.9–119; **Large scale atmos. perturbations** (Doporto), 8.9–164; **Pressure jump line** (Hand), 8.9–202; **Frontal clouds** (Zak, Borovikov), 8.9–253; **Severe storm effects on tree potential gradients** (Burr), 8.9–316.

8.9–174 551.515:551.557.2

*Fawbush, E. J.; Miller, Robert C. and Starrett, Loyd G. (*all, Air Weather Service*), **Severe local storms and mid-tropospheric flow patterns.** *American Meteorological Society, Bulletin,* 38(3):115–123, March **1957.** 9 figs., 2 tables, 6 refs. **DWB, DLC**—Tornadoes, hail and wind storms (winds >50 kn not connected with tornadoes) for 1942–51 (3616 days) were tabulated according to season (Oct.–Feb., March–April, May–June, and July Sept.); region (26 regions each comprising 1, 2, 3, 4, or 6 states); flow pattern and related fronts, troughs, cyclones, anticyclones or ridges on 500 mb charts. About half of the days showed some severe storm activity somewhere in the U. S. About 80% of cases were associated with fronts, i.e., within 150 mi of a front. More tornadoes (87%) were associated with fronts than hailstorms (74%). Seasonal variations in the 3 types and severe storms are plotted, showing marked peak in May–June. Maps show areas where each kind of storm predominates in each season. Table shows number of occurrences of mid-tropospheric flow by 5° squares. Flow (500 mb) upstream from the area of severe storms was almost always WSW or W, regardless of region. Positions of severe local storms relative to 500 mb cyclone or anticyclone centers, as shown on parallelograms, indicate a southeastward directed obliqueness for tornadoes and hailstorms but not for windstorms: i.e., greatest tornado or hail activity was some 18° of long. E and 3.5° lat. S. of cyclone centers. No difference was found between percentages associated with each of the four types of 500 mb flow patterns (cyclones 50%, troughs, 51%, anticyclones 50% and ridges 40%). *Subject Headings:* **1. Severe local storm frequencies 2. 500 mb flow-severe storm relationships 3. Tornado frequency distribution 4. Hail frequency distribution 5. Wind storm frequency distribution 6. United States.**—*M.R.*

8.9–175 551.515:551.509.54:551.578.7

Jacobson, Arthur L. (*W.B.A.S., Great Falls, Mont.*), **Anomalous upper air lows over Northwestern United States.** U. S. Weather Bureau, Oct. 5, **1956.** 8 p. 7 charts. Typescript. **DWB**—Seven cases of "inverted" upper air troughs approaching or developing in the Pacific Northwest are analyzed, discussed and the relative positions of the 700 mb vs the 500

mb centers for several days plotted on charts. The inverted trough is one which does not slope upwards towards the cold (i.e., the N. or N.W.) air mass. Many of these cases were associated with heavy hail in Montana or nearby areas (as shown on charts), usually the inverted low becomes normal as it recurves to N.E. *Subject Headings:* **1. Inverted upper air lows 2. Hail forecasting 3. Northwestern United States 4. Montana.**—*M.R.*

8.9–176 551.515:525.63

Lundbak, Asger, **North Sea storm surge of Feb. 1, 1953, its origin and development.** *Geografisk Tidsskrift*, Copenhagen, 54:8–23, **1955.** 4 figs., 11 refs. **DWB**—The various factors affecting the tidal levels in the North Sea (Denmark, Holland, Belgium and England) and its coasts are discussed analytically, and the contribution of each factor to the storm surge of Feb. 1, 1953 estimated for various places. Complex astronomical tides, barometric and wind pressure effects, effect of shoaling currents, etc., are among the factors considered. The residual wind factor in the tide is shown graphically for London Bridge and for Harlingen, Brouwershavn, and Esbjerg, for Jan. 31–Feb. 2 in relation to the astronomical tide. Synoptic conditions, winds, etc., are discussed as well as tidal conditions. The bulk of the data is taken from ROSSITER (1954). *Subject Headings:* **1. Storm surge, North Sea (Feb. 1953) 2. Storm tides 3. North Sea.**—*M.R.*

8.9–177 551.515.3(757)

Beebe, R. G. (*U. S. W. B. Airport Station, Atlanta, Ga.*), **A note on tornado occurrences in South Carolina.** U. S. Weather Bureau, June **1953.** 5 p. 2 tables. Typescript. **DWB**—Dates and times of tornado occurrences since 1934 in Mississippi, Alabama, Georgia and South Carolina served as a basis for this study. Purpose of the study is to determine the frequency of association of tornadoes in South Carolina with tornadoes in one of the other three states. The author finds that in Jan.–May tornadoes in Mississippi, Alabama and Georgia which are associated with pre-frontal activity can be expected to move into South Carolina in one out of four cases. During the rest of the year this relation is negligibly low. *Subject Headings:* **1. Tornado statistics 2. South Carolina 3. Mississippi 4. Alabama 5. Georgia.**—*G.T.*

8.9–178 551.515.3:551.571.7 551.515.4:551.571.7

Bhalotra, Y. P. R. (*Met. Off., New Delhi*), **Will it be a duststorm or thunderstorm?** *Indian Journal of Meteorology & Geophysics*, Delhi, 5(3):290–291, July **1951.** 2 tables. **DWB, DLC**—Comparison of relative humidity and mixing ratio data at 950, 900, 850, 700 and 600 mb levels (0530 sounding) on days with thunderstorms and days with dust storms during May and June 1946–1952 at New Delhi, show no significant difference in mean humidity conditions before thunderstorms from conditions before dust storms (w/o thunderstorm), and 4 examples are cited to show higher moisture content on days with dust storm than on days with shower. Thus no predictive value can be ascribed to humidity values. The same is true of upper air temperature on 2 types of days (no difference). *Subject Headings:* **1. Dust storm forecasting 2. Upper air humidity 3. Thunderstorm forecasting 4. New Delhi, India.**—*M.R.*

8.9–179 551.515.4:551.551

Galway, Joseph G., **The lifted index as a predictor of latent instability.** *American Meteorological Society, Bulletin*, 37(10):528–529, Dec. **1956.** 3 figs., 2 refs. **DWB**—The "Lifted Index" used by SELS is defined and compared statistically with the Showalter Stability Index. It is stated that the Lifted Index is better as a forecast tool for prediction of latent instability (say from 0900–1500 local time) than is the Static Stability Index of Showalter. The essential difference is in the level from which the air parcel is lifted (graphically) to the 500 mb. level to get the temperature difference used as an index. A total of 339 cases in 1954 and 1955 (spring and summer) were analyzed to test the two lifting indexes against later radiosonde data and against each other. *Subject Headings:* **1. Lifted Index 2. Showalter's Stability Index 3. Forecasting instability areas.**—*M.R.*

8.9–180 551.515.711

§Ohtaki, T., **A developed travelling anticyclone.** *Journal of Meteorological Research*, Tokyo, 5(9):703–711, Nov. **1953.** 15 figs., 12 refs. **MH-BH**—A developed traveling anti-

cyclone which passed through Hokkaido from the northern part of the Japan Sea on April 13, 1952, is investigated. The results obtained are as follows: (1) From the vertical distribution of meteorological elements the anticyclone under consideration appears to be of the cold type, with a height of 6 km. (2) Development depends more on upper convergence than on lower divergence, as shown earlier by SUTCLIFFE. (3) In agreement with TAKAHASHI the following relation is obtained for the movement of an anticyclone: $V=3.9+0.35\ (p-1010)$, where V is the velocity of anticyclone center and p the central pressure. (4) In the developing stage of anticyclone with large relative convergence, like in the case under study, a strong wind belt is apt to be formed along the back side of the anticyclone. *Subject Headings:* **1. Anticyclogenesis 2. Anticyclone movement 3. Hokkaido, Japan.**—*Author's abstract.*

8.9–181 551.515.8(263.4)

Franceschini, Guy A., **Modifications in tropical air crossing the Gulf of Mexico toward the United States.** Texas. Agricultural and Mechanical College. Dept. of Oceanography, Contract AF 19(604)-169, Scientific Report, No. 3, April 1954. 12 p. 9 figs., table, 4 refs., eq. **DWB**—Changes occurring in the lower levels of maritime tropical air moving across the Gulf of Mexico are measured. Computations are based on radiosonde observations made at the termini of selected trajectories. Each trajectory is discussed. It appears that the modifications can be explained qualitatively in terms of surface water temperature distribution and horizontal mass divergence of the air. *Subject Headings:* **1. Tropical air mass modification 2. Gulf of Mexico.**—*Author's abstract.*

8.9–182 551.515.8:551.58

Khromov, S. P., **Geograficheskoe razmeshchenie glavnykh frontal'nykh zon v zemnoĭ atmosfere.** [The geographical distribution of main frontal zones in the earth's atmosphere.] *Vsesoiuznyĭ Geograficheskiĭ S"ezd, 2nd, Leningrad, 1947, Trudy,* 2:193, 1948. **DLC**—The mean distribution of the main frontal zones in the general circulation of the atmosphere is a new climatological problem which originated about 20 years ago. The first attempts of plotting main fronts on climatic maps were made in 1928–1932. Complete world maps of main frontal zones were constructed for the first time by the author in 1939. In view of the progress of science since then they need to be readjusted. An experiment of such a readjustment of maps was presented by the author at the conference. The maps differ from preceding maps because of the fact that all new achievements of science have been taken into consideration. The principle of construction of the maps remained unchanged according to peculiarities of the climatic wind field (line of convergence) and the distribution of pressure (deformation fields). The maps denote the importance of the dynamic essence of the climate and are, therefore, instrumental in the explanation and classification of climates. Finally, the author points out that lists of references indicate similar maps were published in 1945 in the U. S. in the new **Climatology** by HAURWITZ but he has not seen them. *Subject Headings:* **1. Frontal zones 2. General circulation 3. Climatic maps 4. World climatic charts.**—*A.M.P.*

8.9–183 551.515.8(521.28)

§Yasuda, H., **Study of the Bōsō front appearing in winter season.** *Journal of Meteorological Research,* Tokyo, 7(2):61–67, March 1955. 8 figs., 2 tables, 5 refs. In Japanese; English abstract p. 61. **DWB**—The Bōsō front, which frequently appears in winter and is so called in this paper, is different from what is generally mentioned, and is a local front formed between two wind currents of different trajectory within the same polar continental air mass. The author studied the clouds associated with the Bōsō front. Obtained results are as follows. (1) Precipitation occurs behind the front, and synoptic situations which result in the occurrence of precipitation generally fall into two different types: Type 1—Advection of south-east warm air; Type 2—Oscillation of frontal line. (2) The front oscillates under the influence of the rise and fall of the high which is produced by the radiation inland. (3) The cloud amount of strato-cumulus is affected by the variation of water vapour tension of the surface in 3 or 4 hours, and the intensity of the front is affected by the temperature of the Siberian polar continental air mass. *Subject Headings:* **1. Bōsō front 2. Polar fronts 3. Japan.**—*Author's abstract.*

RADIATION AND TEMPERATURE

RADIATION

See also: **Absorption coefficients of gases** (Ghosh, Edwards), 8.9–27; **Radiation conf.** (Wörner), 8.9–53; **Solar furnaces** (Laszlo), 8.9–108; **Radiation balance** (Möeller), 8.9–112; **Turbidity factor** (Danč), 8.9–114; **Radiation data, Basel** (Bider), 8.9–120; **Infrared radiation instruments** (Matzke), 8.9–130; **Min. temp. forecasting** (Kopáček), 8.9–145; **Volcanic dust effects on radiation** (Enger, Fritz), 8.9–151; **Vertical temp. gradient** (Dobosi), 8.9–195; **Effect of solar protons on upper air winds** (Shuleĭkin, Korneva), 8.9–236; **Absorption by clouds** (Feĭgel'son), 8.9–251; **Radiation climat.** (Godson), 8.9–281; **Temp. profiles** (Halstead), 8.9–296.

8.9–184 551.521

Fleischer, Richard, **Der Jahresgang der Strahlungsbilanz sowie ihrer lang- und kurzwelligen Komponenten. (Das System Strahlungsbilanz-Globalstrahlung).** [The annual variation of the radiation balance including long and shortwave components: the system of radiation balance-global radiation.] *Germany. Deutscher Wetterdienst, Berichte,* 4(22):32–38, **1956.** 6 figs., 3 tables, 5 refs. **DWB, DLC**—At the Hamburg Met. Observatory the radiation balance, the infrared counter radiation of the atmosphere, the long wave radiation of the earth's surface were studied by means of a Schultze balance meter, and the counter radiation and its reflection at the earth's surface were studied with a Moll-Gorczyński solarimeter. On the basis of these data collected over a number of years the author analyzes the annual variation of radiation balance on the basis of daily totals of radiation balance and its components, namely outgoing radiation from the earth's surface, counter radiation of the atmosphere, total radiation and total radiation reflected at the earth's surface (shown in a graph), and the behavior of radiation balance as a function of total radiation, and the time of greatest radiation contrast between day and night. *Subject Headings:* **1. Radiation balance 2. Annual radiation balance variations 3. Global radiation.**—*I.L.D.*

8.9–185 551.521:016

†Godson, Warren Lehman, **Atmospheric radiation: current investigations and problems.** *World Meteorological Organization,* [*Publication*], No. 38, TP. 13; Technical Note, No. 8, **1955.** 32 p. 151 refs. French, Russian and Spanish summaries, preceding p. 1. **DWB**—The entire field of solar, atmospheric and terrestrial radiation is reviewed with respect to investigations reported by several authors during 1950–53. The general theory of radiative balance, the effects of pressure, temperature, O_3, CO_2, etc. on the transmission, balance, absorption, diffusion, scattering and reflection, methods of calculation and radiation charts; differences in different climatic regions, methods of research and applications, are systematically reviewed. The report was originally presented as a scientific paper at the 1953 WMO session of the Commission for Aerology at Toronto. A thorough bibliography is appended. *Subject Headings:* **1. Radiation research 2. Radiation bipliographies.**—*M.R.*

8.9–186 551.521:551.511.13

†Lauscher, Friedrich. **Strahlungs- und Wärmehaushalt.** [Radiation and heat balance.] *Germany. Deutscher Wetterdienst, Berichte,* 4(22):21–29, **1956.** 4 figs., table, 53 refs. **DWB, DLC**—This article contains a discussion of the total energy balance of the earth represented graphically and in a table giving the percentiles of the annual radiation and heat transformation of the earth and of its atmosphere, the energy transformation at the earth's surface and in the free atmosphere, the methodology of the radiation balance meter and its application to energy exchange studies at the earth's surface and in the free atmosphere, the solar constant values and the transformation of radiant energy into temperature, reflection of solar radiation from a terrestrial sphere entirely covered with water, albedo values of the earth's surface and radiation balance of surfaces with different albedos, and special studies on the relation between radiation and heat balance relation to glacier and forests. *Subject Headings:* **1. Radiation balance 2. Heat balance 3. Energy transformation.**—*I.L.D.*

8.9–187 551.521:551.510.53 551.547.3:550.38

†London, Julius; Ohring, George and Ruff, Irwin, **Radiative properties of the stratosphere.** N. Y. Univ. College of Engineering. Research Div. Dept. of Meteorology and Oceano-

graphy, Contract AF 19(604)-1285, Final Report, Oct. 1956. 48 p. 9 figs., 3 tables, 53 refs., eqs. **DWB**—In Sec. 1, the radiation budget of the stratosphere is determined for the months of Jan., April, July, and Oct. and the latitude belts 0–10°N, 30–40°N, and 70–80°N. It is found that the stratosphere is not in radiative equilibrium. The stratospheric emission of infrared radiation is about twice as large as the stratospheric absorption of solar energy, on the average, and the largest net radiative loss occurs at high latitudes during all seasons. Carbon dioxide is the most important gas in the stratosphere as far as infrared emission is concerned. In Sec. 2, temperatures and heights of the 100 mb surface at three stations in the auroral zone were related to geomagnetic activity by the method of superposed epochs for a period of one year. The results obtained were inconclusive, not revealing any definite relationship between the meteorological parameters and geomagnetic activity. *Subject Headings:* **1. Stratospheric radiation 2. Upper air pressure variations 3. Geomagnetic activity.**—*Authors' abstract.*

8.9–188 551.521

Mörikofer, W., **The present state of radiation research.** *I.U.G.G. Association of Meteorology, Rome, Sept. 1954, Scientific Proceedings.* London, Butterworth, 1956. p. 521–525. **DWB**—In this general review, the author discusses the development of radiation research in this century beginning with direct radiation, the gradual interest in diffuse sky radiation and of total radiation; the radiation exchange between ground and atmosphere including visible and long-wave radiation; the instrumental and methodical development of radiation research; and the meteorological and climatological evaluations of the data obtained. *Subject Heading:* **1. Radiation research.**—*I.L.D.*

8.9–189 551.521

Shaw, R. H. (*Iowa State College, Ames, Iowa*), **A comparison of solar radiation and net radiation.** *American Meteorological Society, Bulletin,* 37(5):205–206, May 1956. 2 figs., 4 refs., 2 eqs. **DWB**—Daily values of solar and net radiation at Ames, Iowa were compared for the period, late June through Nov., 1954. It was found that by dividing the data into two groups, clear days and cloudy days, regression lines could be computed which fitted the data very well. The correlation between net radiation and solar radiation was 0.98 for clear days and 0.97 for cloudy days. *Subject Headings:* **1. Solar radiation 2. Radiation balance.** —*Author's abstract.*

8.9–190 551.521.1:620.9

Baum, V. A. (*Heliotechnical Lab., Krzhizhanovsky Power Inst., U.S.S.R., Acad. of Sci., Moscow*), **The use of solar energy.** *Journal of Scientific and Industrial Research,* Sec. A, New Delhi, 14(8):365–373, Aug. 1955. 8 figs., 14 refs. **DWB, DLC**—The results of theoretical studies of the solar climate and of experimentation on devices and installations for the mastering and utilization of solar energy conducted over a period of several years by the Krzhizhanovsky Power Institute in different regions of the U.S.S.R. are presented and discussed. Some of these installations are divided into 2 groups—with and without special devices for concentrating the sun's rays—as a small distillation unit, a solar boiler with a paraboloid mirror producing 50–60 kg steam per hr, a regenerative three step distillation unit, an absorption solar refrigerator and an installation for high temperature work with an accurate mirror 2 m in diameter—(all group 2)—are described in detail. *Subject Headings:* **1. Solar energy utilization 2. Solar distilleries.**—*A.M.P.*

8.9–191 551.521.1:551.588.2

Becker, Clarence F. (*Wyoming Univ.*) and Boyd, James S. (*Mich. State Univ.*), **Solar radiation availability on surfaces in the United States as affected by season, orientation, latitude, altitude and cloudiness.** *Journal of Solar Energy Science and Engineering,* Phoenix, Ariz., 1(1):13–21, Jan. 1957. 17 figs., table, 21 refs. **DWB, DLC.** "Based on Ph.D. Thesis by senior author, Michigan State Univ. Appeared as *Michigan Agricultural Experiment Station, Journal,* Article No. 1978." This paper presents a method for estimating the quantity of solar radiation available on surfaces with various orientations in the U. S. Seasonal curves show the availability of solar radiation days on surfaces with various orientations at or near sea level. Polynomials have been developed for curves of the horizontal surface. The

ratios of solar radiation incident on horizontal surfaces are presented in the form of curve for which polynomials have been developed. Curves and polynomials giving the percentag increase in solar radiation with altitude can be used to correct the values for conditions at near sea level. A regression equation correlates the relation of recorded to calculated clou less sky radiation and cloudiness. Comparisons are shown between the calculated cloudless da radiation determined from the curves and polynomial and measured clear day radiatio *Subject Headings:* **1. Radiation on variously oriented surfaces 2. Solar radiation 3. Unite States.**—*Authors' abstract.*

8.9–192 551.521.3:551.593.6

Sitnik, G. F., **Koeffitsient prozrachnosti zemnoĭ atmosfery i vopros ob uchete oreola p izmeneniiakh iarkosti na diske solntsa.** [Transparency coefficient of the earth's atmosphe and the problem of allowance for aureole during variations of brightness of the solar disc.] *A tronomicheskiĭ Zhurnal,* Moscow, 33(1):101–113, Jan./Feb. **1956.** 2 figs., 15 refs., 35 eq Russian and English summaries p. 101. **DLC**—It is claimed in this paper that the tran parency coefficient of the earth's atmosphere is different for a point source and an areal sour of light. The difference is due to a scattering component in the total extinction of light by t atmosphere. This statement has been used as a basis to prove that the influence of the aureo is eliminated when absolute photometric measurements of the brightness of areal objects a extrapolated to a region beyond the confines of the terrestrial atmosphere. In the case relative measurements of brightness on the solar disc (drop of brightness from the center the limb, photometric profile of a spot) new formulae have been obtained to make allowan for aureole. Allowance for halo, as expressed by these formulae, is essentially an allowance f the difference between the atmospheric transparency coefficients for points of unequal brigh ness on the solar disc. *Subject Headings:* **1. Atmospheric transparency coefficients 2. Aureo effects.**—*Author's abstract.*

TEMPERATURE

See also: **Frost data, Canada** (Boughner et al.), 8.9–23; **Upper air temp., Greenland** (Bedel), 8.9–31; **Frozen words** (Wilson, Rickard), 8.9–59; **Insolation of upper atmos. and satellites** (Gast), 8.9–68; **Lightning-temp. relationships** (Wegener), 8.9–76; **Air temp., N. Atlantic** (Hay), 8.9–79; **Long range temp. forecasting** (Gabilly), 8.9–148; **Grass temp.** (Norman et al.), 8.9–297.

8.9–193 551.524.37:551.524.34(439.

Péczely, György, **A −10 C° alatti napi középhőmérsékletek szekuláris menetéről.** [Sec lar variations of daily mean temperatures below −10°C.] *Időjárás,* Budapest, 60(3):178–18 May/June **1956.** table, eqs. **DLC**—Number of days with mean temperature below −10° in Dec., Jan. and Feb. are tabulated for each winter from 1861 to 1956. The last four decad of the 19th century are found to show a larger number of such days than the first four decad of this century, and a test shows that the difference is statistically significant. After the la thirties the number of days with means below −10°C has been increasing but winter ten peratures in general have not shown a corresponding decrease. *Subject Headings:* **1. Fro frequencies 2. Temperature trends 3. Hungary.**—*G.T.*

8.9–194 551.524.3

Temnikova, N. S., **Zamorozki na chistom paru i na travostoe.** [First autumn frosts tilled soil and over grass.] *Meteorologiia i Gidrologiia,* Leningrad, No. 5:38–40, Sept./Oc **1955.** 4 figs. **DWB, DLC**—The author develops a simple graphic method for obtaining t average dates over many years for the beginning and end of first autumn frosts over tilled s and over grass applicable to any region of the U.S.S.R. On the assumption that a relationsh exists between the dates of first autumn frosts and the mean minimum air temperature duri the months in which these dates occur, the problem is reduced to establishing a correlati between mean minimum air temperature and the temperature at the tilled soil surface grass cover. *Subject Headings:* **1. Frost 2. Frost probability dates 3. Minimum temperatur 4. U.S.S.R.**—*I.L.D.*

8.9–195 551.524.4:551.511:551.521(439.1)

Dobosi, Zoltán, **A függőleges hőáramok szerepe a léghőmérséklet bapi menetének kialakí-ában.** [Role of vertical heat transport in diurnal temperature variation.] *Időjárás*, dapest, 60(1):45–51, Jan./Feb. **1956.** fig., 10 tables, 6 refs. Russian and English sum-ries p. 45. **DLC**—Since 1950 air temperature at 10, 50 and 100 cm has been measured at the dőhátpuszta station of the Meteorological Institute of Budapest University at two-hour ervals from 7 a.m. to 9 p.m. by means of Assmann psychrometers. Data on frequencies positive and negative temperature gradients between 10 and 100 cm are presented for winter months. In about half the cases a negative temperature gradient is found to be intained throughout the day, i.e., the temperature is lower at 10 cm than at 100 cm. four selected days (two with and two without snow cover, both under cloudy and clear) the diurnal variation of surface radiation balance and of the temperature gradient be-en 10 and 100 cm are compared. Poor agreement between variations of these two values gests that in most cases advective downward currents rather than radiation conditions are ponsible for the existence of negative temperature gradients near the ground in winter. *ject Headings:* **1. Vertical temperature gradient 2. Heat transport 3. Radiation balance Budapest, Hungary.**—*G.T.*

8.9–196 551.524.4 551.571.4

Elnesr, Mustapha K., **Profils de l'humidité et de la temperature audessus du gazon court.** umidity and temperature profiles over short grass.] *Journal Scientifique de la Météorologie*, ris, 7(26):249–253, April/June **1955.** 5 figs., table, 5 refs., eqs. French, English and nish summaries p. 249. **DWB**—Results of 14 series of observations on the temperature humidity (mixing ratio) gradient above a lawn (made on July 8 and 9, 1953 at the Val eux scientific observatory with electrical elements located at 5, 23, 28, 100 and 150 cm ve the ground) are represented by tables and profiles and discussed. It was found that the n lapse rates can be expressed by a logarithmic law, for both stable and instable conditions. observations were made during cloudy weather with fresh breezes (5 m/sec) and the aver-s do not take into account the times of day which range from 9 a.m.–5 p.m. *Subject adings:* **1. Vertical humidity gradient above grass 2. Vertical temperature gradient above ss 3. Val Joyeux, France.**—*M.R.*

8.9–197 551.524.4:518.2

Malkevich, M. S., **Metod teoreticheskogo opredeleniia vertikal'nogo gradienta tem-atury vozdukha.** [A method for determining theoretically the vertical air temperature dient.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz.*, No. 6:676–688, June **1956.** 3 figs., le, 15 refs., 27 eqs. **DLC**—A method for solving the integral equation describing the dis-ution with height of the atmospheric temperature gradient is presented. The method sists of approximating the core of equation by characteristic functions and subsequently lacing the integral equation with an equivalent differential equation. The selectivity of orption of radiation is taken into account since its distribution is variable. *Subject Head-:* **1. Mathematical techniques 2. Vertical temperature gradient.**—*I.L.D.*

8.9–198 551.524.4:551.571.4(521.43)

*Osumi, Kunio, **Diurnal and annual change of temperature and humidity in the lower osphere at Wajima.** *Journal of Meteorological Research*, Tokyo, 7(2):122–124, March **5.** 6 figs., 2 tables. In Japanese. **DWB**—Tables give average 0 and 12 h temperature relative humidity at 0, 3, 6, 9, 12, 15, 20, 25 and 30 hundred feet elevation for each month he year for Wajima. Graphs show Feb. and May curves for 0 and 12 hours from 1000 700 mb. Other features are analyzed statistically. *Subject Headings:* **1. Temperature iles 2. Humidity profiles 3. Wajima, Japan.**—*M.R.*

8.9–199 551.524.7(410)

Scrase, F. J., **Variations of temperature in the stratosphere up to 30 km over the British s.** *I.U.G.G. Association of Meteorology, Rome, Sept. 1954, Scientific Proceedings.* London, terworth, **1956.** p. 514–517. fig., 11 refs. **DWB**—This summary of the stratospheric perature variations is based upon soundings made at night at Downham Market and

Lerwick during 1950 and 1951. The author discusses the following: annual variations, standard deviations and irregular fluctuations, diurnal variation, latitudinal variations and correlation with the troposphere. *Subject Headings:* **1. Upper air temperature variations 2. British Isles.**—*I.L.D.*

SOIL TEMPERATURE

See also: **Climatic summaries, Canada** (Boughner et al.), 8.9-23; **Soil temp. data** (Sheerar), 8.9-273.

8.9-200 551.525.5

Legget, R. F. (*National Research Council of Canada*), **Permafrost research.** *Arctic*, Montreal, 7(3/4):153-158, **1954.** fig. (photo), 14 refs. **DLC**—The various programs of permafrost investigations initiated in Alaska by the U. S. and in Canada by the Canadian authorities and their accomplishments are reviewed. These include the investigations of the Alaska Highway by the U. S. permafrost survey and by the Division of Building Research of the National Research Council of Canada which include studies on the variation of soil temperature. Needed research on permafrost is outlined; this involves the mapping of permafrost distribution, detection of permafrost, the physical and mechanical properties of frozen soils, etc. *Subject Headings:* **1. Permafrost research 2. Alaska 3. Canadian Arctic.** —*I.L.D.*

WATER TEMPERATURE

See also: **Sea surface temp., N. Atlantic** (Hay), 8.9-79; **Sea temp. variations, No. Pacific** (Rodewald), 8.9-83; **Sea surface temps.** (U. S. Coast and Geod. Survey), 8.9-84.

8.9-201 551.526.8(234.3)

Eckel, O. (*Vienna*), **Temperaturprobleme der Alpenseen.** [Temperature problems in the Alpine lakes.] *Wetter und Leben*, Vienna, 7(8/11):253-256, **1955. DLC**—In this quantitative discussion of the thermal regime of Alpine lakes the author considers the heat balance equation and the evaluation of its several components, namely radiation balance, horizontal thermal balance and vertical thermal balance. The determination of the total heat balance of the lake basin, and the practical application of the heat balance equation for forecasting thermal conditions under changed states of heat, inflow, water level variations, etc. are given. *Subject Headings:* **1. Heat balance of lakes 2. Alpine lakes 3. Austria.**—*I.L.D.*

PRESSURE AND WIND

PRESSURE

See also: **Global pressure oscillations** (Haurwitz), 8.9-28; **Satellite pressure measurement** (Sicinski et al.), 8.9-70; **Geostrophic wind field over sea** (Drogaĭtsev), 8.9-113; **Barometric levelling** (Sandig), 8.9-131; **Isobaric surfaces** (Bessemoulin), 8.9-136; **Synoptic chart accuracy, Caribbean** (Kasparbauer), 8.9-143; **Upper air pressure** (Teich), 8.9-170; **Radiative properties of stratosphere** (London et al.), 8.9-187; **Geostrophic trajectories** (Durst, Davis), 8.9-208; **Wind and accompanying pressure dip, Kü-Suido, Japan,** 8.9-224; **Geostrophic winds** (Kukhto), 8.9-235.

8.9-202 551.541:551.515.8(764,789)

Hand, James M. (*Severe Local Storms Res. Unit., U. S. W. B., Wash., D. C.*), **The pressure jump line of April 2-3, 1956.** *Monthly Weather Review*, Wash., D. C., 84(4):163-164, April **1956.** fig., ref. **DWB, DLC**—The pressure jump line was traced from the New Mexico-Texas border at 1300 CST of April 2 to extreme eastern Texas at 0300 CST, April 3. The average speed of the line over the Local Storm Research Network was about 40 mph. The intensities of individual pressure jumps as read from the network barograms are shown on a diagram. *Subject Headings:* **1. Pressure jump line 2. New Mexico 3. Texas.**—*I.L.D.*

8.9–203 551.541:551.558.21

Roze, N. V., **O stat'e S. P. Repina: Nekotorye svoĭstva podvetrennykh vozdushnykh voln.** [On S. P. Repina: some properties of leeward atmospheric waves.] *Meteorologiia i Gidrologiia*, Leningrad, No. 4:66, April **1956.** eqs. Original article in *Ibid.*, No. 1, **1953. DWB, DLC**—The author points out that in the above article the calculations on the movement of air masses on mountain ranges carried out by the method of A. A. Dorodinym contains errors. Repina calculated the length of the wave as a function of temperature gradient without considering that the adiabatic temperature gradient depends upon the temperature gradient. *Subject Headings:* **1. Lee waves 2. Temperature gradient. I. Repina, S. P.**—*I.L.D.*

8.9–204 551.541:551.593.1

Tatarskiĭ, V. I., **O pul'satsii amplitudy i fazy volny, rasprostraniaiushcheĭsia v slaboneodnorodnoĭ atmosfere.** [The pulsations of amplitude and the phases of waves propagated in a moderately heterogeneous atmosphere.] *Akademiia Nauk SSSR, Doklady*, 107(2):245–248, March 11, **1956.** 4 refs., 23 eqs. **DLC**—The problem of the propagation of waves in a medium with a moderately heterogeneous coefficient of refraction is treated theoretically and a more simple and practical solution than that of A. M. Obukhov is obtained. The coefficient of refraction is assumed to be $\eta=\eta_1+1+(r)$, where $\eta_1(r)$ is the deviation of the coefficient of refraction from the mean value (unity) and that $\eta_1 \leq 1$. Equations for calculating the scintillation of stars and analogous phenomena are presented. *Subject Headings:* **1. Pressure waves 2. Refraction phenomena.**—*I.L.D.*

8.9–205 551.543.3

Portig, Wilfried, **Erste Mitteilung über schnellaufende globale Luftdruckwellen.** [First communication on rapidly moving global pressure waves.] *Meteorologische Rundschau*, 10(2):54–58, March/April **1957.** 6 figs., table, 8 refs. **DWB**—Rises and falls of pressure travel westward by 45° long. in 24 hrs or less. Oscillations have a periodicity of about 4 days and can be traced round the world. The wave of 11–16 Sept. 1955 is analyzed for 10° steps of latitude 60–10°N. A correlation of 0.56 was found between 24-hr changes of pressure in Europe and Caribbean a day later and high correlations are quoted even between individual stations. Data for 142 places for Sept. 1955 were analyzed harmonically and statistically and results plotted by 5° zones 0–80°N. The 4-day wave appears everywhere except in W-wind zone. *Subject Heading:* **1. Pressure waves.**—*C.E.P.B.*

8.9–206 551.547.2

Portig, Wilfried, **Bericht über Messungen zur Reduktion des Barometerstandes auf den Meeresspiegel.** [Report on measurements for reduction of barometer to sea level.] *Meteorologische Rundschau*, 10(2):42–44, March/April **1957.** fig. **DWB**—In the tropics a small change of pressure means a large change of gradient wind, and stations near the sea are often at a high level. The usual reduction formula does not apply. Simultaneous readings of mercury barometers were taken at San Salvador and the harbor of La Libertad, 31 km distant and 606 m lower. Calculated reduction temperature Tm plotted against San Salvador temperature To shows much scatter but can be represented by $Tm=0.178\ To+21.8$. This gives better results than the reduction table in use, which assumes Tm=mean of coast and station temperatures, and does not go far enough. *Subject Heading:* **1. Pressure reduction.**—*C.E.P.B.*

8.9–207 551.547.5:517.514.3

Gilchrist, A., **The representation of circumpolar 500 mb charts by a series of spherical harmonics.** *Great Britain. Meteorological Research Committee, M.R. Papers* 1040, 19th February, **1957.** 9 p., 13 figs., 5 tables, 5 refs., eqs. Mimeo. **DWB**—Four 500 mb circumpolar charts were represented by coefficients up to P_{12}^{12} (91 coefficients) and P_8^8 (45 coefficients). Variance of calculated charts averaged 99.15% of total variance in first case and 97.2% in latter. The representations could be used to select charts which have basic similarities, but even in using harmonics up to P_{12}^{12} some features which appear important synoptically are not reproduced. *Subject Headings:* **1. Upper air pressures 2. Spherical harmonics.**—*C.E.P.B.*

WIND

8.9–208 551.55:551.542.1

Durst, C. S. and Davis, N. E., **Accuracy of geostrophic trajectories.** *Meteorological Magazine*, London, 86(1019):138–141, May **1957.** 2 figs., 3 tables, 4 refs. **DWB**—Root-mean-square value of ageostrophic wind over Britain is >5 kt, average duration 6 hr. Probable vector error of geostrophic wind is 5 kt. Combining these, probable vector error in assuming geostrophic to be true wind is about 7 kt. Departure from true position 50 mi after 6 hrs, 100 mi after 24 hrs, etc. Distance apart of two air masses at 700 mb due to eddy effect is tabulated for 6–36 hrs and 1–7 days; this effect rapidly enhances inaccuracy of geostrophic trajectories. *Subject Headings:* **1. Geostrophic approximation 2. Aerial navigation.**—*C.E.P.B.*

8.9–209 551.555.9:551.43

§*Mitchell, J. Murray, Jr. (*Climatological Services Div., U. S. W. B., Wash., D. C.*), **Strong surface winds at Big Delta, Alaska: an example of orographic influence on local weather.** *Monthly Weather Review*, Wash., D. C., 84(1):15–24, Jan. **1956.** 8+figs., 5 refs. **DWB, DLC**—Strong east-southeasterly winds occur frequently in Oct.–March at Big Delta, Alaska, which is located near the mouth of the Tanana River gorge (running from Snag, Yukon Territory, to near Fairbanks). The frequency of southerly winds in this area is also quite high—these are treated as a special case. The ESE winds are analyzed statistically according to duration of several types, according to temperatures before and after onset, and according to time of day of onset. It is shown that sharp temperature rises occur sometimes 20° to 25°F or more and usually beginning about 08–09 a.m. regardless of season. The winds are cross gradient and can be predicted by a pressure gradient index (Northway to Big Delta) as well as by synoptic types such as are illustrated. In one case the winds of >40 mph (gusts) lasted 7½ days. The winds are not true mountain-valley winds, but are gorge winds. *Subject Headings:* **1. Surface winds, Alaska 2. Gorge winds 3. Wind duration frequency analysis 4. Synoptic climatology 5. Big Delta, Alaska.**—*M.R.*

8.9–210 551.55:551.41

§Sunde, Alv, **Studies of winds off western Greenland.** *Meteorologiske Annaler*, Oslo, 4(4):36–54, **1956.** 21 figs., table. **DLC**—Discussion of typical weather situations observed during two summer periods. Synoptic situations favoring narrow lee troughs off the west coast are explained and cases of rapid pressure falls analyzed. Katabatic winds were only rarely observed. *Subject Headings:* **1. Coastal winds 2. Katabatic winds 3. Davis Strait 4. West Greenland.**—*A.A.*

8.9–211 551.554:551.556.3:551.588.2

Tabata, S., **Statistical study of topographical effects on the wind speed and direction.** *Journal of Meteorological Research*, Tokyo, 8(6):354–359, July **1956.** 17 figs., 5 refs. In Japanese; English summary p. 354. **DWB, DLC**—In order to estimate the amount of wind energy available for purposes of wind mills a statistical investigation was made of wind speed and direction, both in the free atmosphere and over a mountain. The principal results obtained are as follows: (1) wind speeds observed at the top of a mountain are proportional to those in the free atmosphere for each wind speed. (2) The stronger the wind the more frequently the winds cross perpendicularly to the stretch of the mountain range. The changes of direction are due to large-scale topography like the general orographic features, but not to local topography within 2–4 km in horizontal length. (3) Wind directions are often changed more than 90° by topography. *Subject Headings:* **1. Wind velocity 2. Topographical influences 3. Windmills.**—*Author's abstract.*

TURBULENCE

See also: **Atmos. turbulence in air navigation,** 8.9–73; **Turbulence res.** (Landers, Sipple), 8.9–116; **Aerodynamic resistance of tethered balloons** (Saba), 8.9–134; **Latent instability** (Galway), 8.9–179.

8.9–212 551.551:519.24

Lin, C. C., **A simplified formulation of the similarity concepts in isotropic turbulence.** *Journal of the Aeronautical Sciences*, 20(4):286, April **1953.** 4 refs., 6 eqs. **DWB**—A short

note suggesting the use of the velocity and length scales, the kinematic velocity and Loitsiansky's invariant as the basic parameters for a dimensional analysis. Cases when the self-preservation of the turbulence decay can be assumed approximately are outlined. *Subject Headings:* **1. Statistical theory of turbulence 2. Similarity concepts.**—*A.A.*

8.9–213 551.551.21:551.556.3:621.311.24

Wax, M. P., **An experimental study of wind structure with reference to the design and operation of wind-driven generators.** *British Electrical and Allied Industries Research Association, Technical Report,* C/T114, **1956.** 24 p. 24 figs., 5 tables, 29 refs.—Previous investigations of gustiness factor are described. An investigation of wind speeds and gusts was carried out at Costa Hill, Orkneys, 500 ft high. Gust anemometers for horizontal and vertical components responding to changes of 0.1 sec were mounted on a 120 ft cruciform mast at 4 points (top, right, left, bottom). Specimen records are shown, and histograms of 10 sec means. Effects of changes of speed on output and structure (blades) are discussed. *Subject Headings:* **1. Wind structure 2. Wind generators.**—*C.E.P.B.*

WIND DISTRIBUTION AND VARIATIONS

See also: **Wind summaries and airfield usability** (Wadsworth), 8.9–75; **Wind direction variability** (Saucier, Brundige), 8.9–216.

8.9–214 551.552:061.3

Anapol'skaia, L. E., **Mezhduvedomstvennoe soveshchanie po izucheniiu vetrovogo rezhima na territorii SSSR.** [Interdepartmental conference on the study of winds in the U.S.S.R.] *Meteorologiia i Gidrologiia,* No. 8:65–66, Aug. **1956. DWB, DLC**—An international conference on the study of the wind regime of the U.S.S.R. was held on April 16–19, 1956 at the A. I. Voeĭkov Central Geophysical Observatory. The papers delivered dealt with the wind regime and wind structure, instrumentation for measuring wind velocity and direction, engineering aspects of wind machines, etc. Resolutions dealt with study of maximum wind velocities in the U.S.S.R., increased research on wind in connection with the expansion of the national economy, etc. *Subject Headings:* **1. Wind regime 2. Wind instruments 3. Wind velocity 4. Conferences 5. U.S.S.R.**—*I.L.D.*

8.9–215 551.552:551.44

Markó, László and Jakucs, László, **A barlangi légáramlás keletkezése.** [Air currents in caves.] *Hidrólogiai Közlöny,* Budapest, 36(4):314–316, Aug. **1956.** fig. Russian and English summaries, p. 315–316. **DWB**—The investigation of air currents at the mouth of the stalagmite cave at Aggtelek led to the conclusion that the air inside communicates with the outside atmosphere through the overlying rock. Since the temperature within the rock generally differs from that on the surface, the difference in air densities in fissures and at the mouth will result in an air pressure differential (chimney effect). This differential induces air currents, the direction of which at the mouth of the cave depends on the temperature of the outside atmosphere, i.e., will be directed outward, or inward, if the latter is above or below the annual mean, respectively. *Subject Heading:* **1. Air currents in caves.**—*Authors' abstract.*

8.9–216 551.552:551.553.5

Saucier, W. J. and Brundidge, K. C. (*both, Agri. and Mech. College of Texas*), **Variability of wind direction in relation to wind speed.** *American Meteorological Society, Bulletin,* 37(9): 462–464, Nov. **1956.** 3 figs., 2 refs., 4 eqs. **DWB, DLC**—It seems obvious that the stronger the wind the less the variations in wind direction, and vice versa. However, a formulation of this principle in vectorial terms and its mathematical demonstration or proof leads to clarification of several observations or analytical concepts whose validity is not so obvious. For example, a wave in weak wind field will be evident on a synoptic chart, but the same degree of perturbation on a strong flow pattern would be evident only as a change in wind speed and possibly a small change in wind direction that would be masked by the crudeness of the reporting codes or observational accuracy. In regions or levels of strong winds the winds should be reported to a higher degree of precision, not a lower degree (as is the practice),

if cyclogenetic perturbations are to be detected. The same concept applies to analysis of jet streams [and balloon trajectories] and climatological steadiness statistics. *Subject Headings:* **1. Wind direction variability 2. Wind steadiness.**—*M.R.*

8.9–217 551.553/4

*Thornthwaite, Charles Warren, **The climate of the soldier, Pt. 4, Determining the wind on the soldier.** *U. S. Quartermaster Corps. Research and Development Branch, Environmental Protection Series, Report* No. 124, Feb. **1949.** 13 p. 24 figs. (some fold), 3 tables, 10 refs. **DWB**—This microclimatic study on the wind speed near the ground, its variation with height depending upon the vertical distribution of temperature contains a discussion and analysis of the wind data within the lowest 25 ft above the ground, especially that obtained by the Soil Conservation Service (U. S. A.). A discussion of the characteristics of the logarithmic and power laws and the empirical equation, expressing the wind profile near the ground, and the construction of tables "by means of which the wind speed at the levels of human activity, 2 and 5 ft above the ground" can be determined from data on wind speed at some higher level and the general temperature distribution in the air. Graphs of the vertical wind speed gradients observed at New Philadelphia, Ohio, during 1948 are presented. *Subject Headings:* **1. Wind speed data 2. Micrometeorological wind profiles.**—*I.L.D.*

8.9–218 551.553(624)

*Sudan. Meteorological Service, **Wind speed statistics.** Its *Pamphlet*, No. 3, Oct. **1954.** 16 p. almost entirely tables. **DWB**—Tables present percentage frequencies of hourly mean wind speed statistics for 13 stations in the Sudan derived from continuous records by Dines pressure tube anemographs during 1949–1953. *Subject Headings:* **1. Wind speed data 2. Dines anemograph 3. Sudan.**—*I.L.D.*

8.9–219 551.553.1

Grigor'ev, A. I., **O sutochnom khode skorosti vetra nad vodoemami.** [Diurnal variation of wind velocity over reservoirs.] *Meteorologiia i Gidrologiia*, Leningrad, No. 3:35–36, March **1956.** table. **DWB, DLC**—Measurements of hourly wind velocity were made simultaneously at 3.0 and 7.8 meters above the surface of an artificial island in Lake Ladoga and data on the mean hourly wind velocity for each period of observation are given in a table. The diurnal variation of wind velocity above the surface of a reservoir at a sufficient distance from its banks is opposite that of the diurnal variation of temperature. The maximum wind velocity occurs in the morning; the minimum in the afternoon. *Subject Headings:* **1. Diurnal wind velocity variations 2. Reservoirs 3. Lake Ladoga, U.S.S.R.**—*I.L.D.*

8.9–220 551.553.11

Pierson, Willard J., Jr., **Effects of eddy viscosity, coriolis deflection, and temperature fluctuation on the sea breeze as a function of time and height.** *N. Y. Univ. Dept. of Meteorology, Meteorological Papers*, 1(2), Jan. **1950.** 29 p. 14 figs., 18 refs., 20 eqs. **DWB**—A simplified model of the sea breeze is developed and compared with actual observational results for Boston, Madras and Batavia, in order to study the development of kinetic energy from differential solar heating. It is assumed that at a point inland the temperature regime will not be affected by the sea breeze, and that at a point at sea there will be no diurnal temperature change. The temperature function with space (distance and height) and time is combined with the hydrostatic equation to determine the pressure distribution, pressure gradient force, and finally hodographs of the sea breeze for various times of the day at the 3 points named above. Agreement is quantitatively good at Boston and Madras, and fairly good at Batavia when theoretical hodographs are compared with observed. *Subject Headings:* **1. Sea breeze models 2. Kinetics of sea breeze.**—*M.R.*

8.9–221 551.553.21:551.513

Flohn, Hermann, **Der indische Sommermonsun als Glied der planetarischen Zirkulation der Atmosphäre.** [The Indian summer monsoon as part of the planetary circulation of the atmosphere.] *Germany. Deutscher Wetterdienst, Berichte*, 4(22):134–139, **1956.** 5 figs., 20 refs., eq. **DWB, DLC**—This study of the Indian summer monsoon during 1953 is based

also upon electrically measured upper altitude wind over Madras, Calcutta and New Delhi as well as upon winds below the cloud cover. The air flow structure above India consists of three planetary wind belts, namely, the extratropical western drift, the tropical eastern flow of the trades and the equatorial west wind zone (S.W. monsoon at the surface). The interaction of the planetary wind belts is discussed with the aid of charts showing the distribution of mean surface pressure during July and wandering monsoonal lows of lower layers; the flow aloft from ESE to WNW coincides with advances of the extratropical west drift over northern India. The outbreak of the Indian SW monsoon proceeds discontinuously from the southern tip of India to the Himalayas. *Subject Headings:* **1. Monsoon winds 2. Upper air winds 3. Planetary circulation 4. India.**—*I.L.D.*

8.9–222 551.553.8:551.578.7

Rodewald, M., **Ein Hagel-Orkan bei Kap Ras el Hadd und seine Ursache.** [Hail-hurricane near Cape Ras-el-Hadd and its origin.] *Der Seewarte*, Hamburg, 17(4):122–125, Aug. **1956.** fig. **DWB, DLC**—Conditions preceding and accompanying a terrible squall at sea off the SE coast of Arabia are described in some detail as recorded by Capt. Pilty of the tanker *Reederei* on April 6, 1956 about 1700 h. The squall, which occurred during passage of a sharp upper trough or cold front (height of 500 mb surface dropped from 5790 to 5670 m and rose to 5810 m from 3–8 April at Bahrein), was accompanied by thunder, lightning, severe hail and cloudburst, as well as dust and sand, and a hurricane force wind shifting to N and NE. Similarity to Tehuantepecer is shown. *Subject Headings:* **1. Hail squalls 2. Hurricane-force winds 3. Gulf of Oman.**—*M.R.*

VERTICAL DISTRIBUTION

See: **Low level wind measurement** (Saha), 8.9–129.

SPECIAL WINDS

See also: **Gorge winds** (Mitchell), 8.9–209.

8.9–223 551.555:001.4

Frleta, I., **Postanak naziva za vjetrove na našem Primorju.** [Origin of the names of winds on the coast of Yugoslavia.] *Yugoslavia. Hidrometeorološka Služba, Vesnik*, 5(1/2):43–45, Jan./June **1956. DWB**—Some two dozen names of winds used on the Adriatic coast of Yugoslavia are mentioned and a few of them referred back to their original Latin, Greek or Arabic sources. *Subject Headings:* **1. Wind terminology 2. Local winds 3. Yugoslavia.**—*G.T.*

8.9–224 551.555:551.543.5(521.7)

Kobe, Japan. Marine Observatory, **On the local weather in the Kii-Suido.** *Journal of Meteorological Research*, Tokyo, 7(3):185–187, March **1955.** 7 figs., table, 8 refs. In Japanese. **DWB**—A short article describing and illustrating special wind conditions and accompanying pressure dip in the harbor of Kii-Suido (34°N, 134°50′E) during a squall. *Subject Headings:* **1. Local winds 2. Pressure dips 3. Kii-Suido, Japan.**—*M.R.*

8.9–225 551.555.6:551.524.37(44)

Arléry, R., **A propos des froids exceptionnels de février 1956, en France.** [Exceptional cold in Feb. 1956 in France.] *La Météorologie*, Paris, Ser. 4, No. 43:159–170, July/Sept. **1956.** 12 figs. French, English and Spanish summaries p. 159. **DWB**—The cold wave which hit France about Feb. 1, 1956 and continued until the 20th in some sections was not the coldest on record (1871 and 1895 were colder in some respects and 1917, 1929, 1942, 1947 and 1954 were very cold, following a cold Jan.). The cold of 1956 was exceptional in following suddenly on a warm winter, in coming when the ground was bare of snow in most areas (so great damage was done to vegetable gardens, grain and fruits), in its duration, and in the high wind speeds (up to 120 mph) at the time of the cold wave (Feb. 2). The soil temperature at 30 cm dropped

unusually rapidly from 1–5 Feb. and in many places froze for the remainder of the month a shown on a series of 8 graphs. Other charts show details of progress and intensity of col wave, snow, etc. *Subject Headings:* **1. Excessive temperatures 2. Severe winters 3. Col wave, France (Feb. 1956) 4. Record cold spells 5. France.**—*M.R.*

8.9–226 551.555.

Krylov, P. A., **Nekotorye nabliudeniia v sukhoveĭnykh raĭonakh Zavolzh'ia.** [Som observations in the "sukhovei" regions of the trans-Volga.] *Akademiia Nauk SSSR, Izvestiia Ser. Geofiz.*, No. 2:191–201, Feb. **1956.** 6 figs., 20 refs. **DLC**—The results of a study o sukhovei winds carried out in the Pugachev district of Saratov Oblast during the summers o 1952 and 1953. Observations (reproduced by graphs and photographs) were made on th variations of atmospheric temperature and relative humidity in the Pugachev district fro Aug. 13 to Sept. 7, 1952 and July 13th to Sept. 20, 1953, the daily wind variations, comparativ variation of atmospheric temperature and relative humidity in a field on irrigated land and a tree tops at a height of 4 m from Aug. 15–Sept. 25, 1953, and on the physical properties o the dust particles associated with the sukhovei. The author attempts to harmonize the variou contradictory opinions on the nature of sukhovei winds. *Subject Headings:* **1. Sukhove 2. Dry winds 3. Pugachev District, U.S.S.R.**—*I.L.D.*

8.9–227 551.555.

Rybina, N. A., **O sukhoveĭakh v Omskoĭ oblast.** [The Sukhoveĭ (dry winds) in th Omsk oblast.] *Meteorologiia i Gidrologiia*, Leningrad, No. 3:36–37, March **1956.** 5 table **DWB, DLC**—Data are presented on the annual incidence of dry winds in Omsk Oblast fo each year from 1940–1954, their monthly distribution, their frequency during different relativ humidities and the frequency of dry winds of varying duration. The synoptic condition associated with the occurrence of dry winds are (1) the presence of a quasi-stationary anti cyclone over the middle course of the Enisei River with its spur directed toward Lake Balkhas and (2) the presence of an anticyclone over Kazakhstan with its ridge oriented in a latitudina direction. *Subject Headings:* **1. Sukhoveĭ 2. Dry winds 3. Omsk Oblast, U.S.S.R.**—*I.L.D*

WIND EFFECTS

See also: **Mean equivalent winds, Pacific,** 8.9–72; **Elec. energy from wind** (Golding), 8.9–106; **Wind utilization, India,** 8.9–109; **Topographical effects on wind speed and direction** (Tabata), 8.9–211.

8.9–228 551.556.8:551.461.

*Bergsten, Folke (*Swedish Met. and Hydrol. Inst.*), **Winds and water levels on the coast of Sweden.** *Geografiska Annaler*, Stockholm, 37(3/4):119–140, **1955.** 5 figs., 6 tables, 8 refs **DLC**—The author presents the method and formulas for determining the influence of wind o water levels and examines the reliability of this method by using wind material from Väderöbod Vinga, Östal Flak, Kullen and Fanö. Calculations of the effective influence of the wind o sea level are given for Väderöbod, Vinga (Sweden) and Danish stations and the general relation ship between wind and sea level is analyzed. Consideration is given also to winds and se levels in the Baltic and anemobaric disturbances in the Baltic, Kattegat and Skagerrak *Subject Headings:* **1. Wind effects on water level 2. Sweden.**—*I.L.D.*

8.9–229 551.556:532.5

Rivière, André and Vernhet, Solange, **Sur l'interprétation des phénomènes d'agitatio au rivage sous l'influence des vents de terre.** [Interpretation of wave motion near the shor induced by winds from the land.] *Académie des Sciences, Paris, Comptes Rendus*, 240(13) 1451–1453, March 28, **1955.** fig. **DWB**—Wave activity near the coast is found to assum different forms according to the direction of land wind in respect of the shore line. Thus th waves are sometimes parallel to the shore, propagating toward it; at other times the wav crests form an angle with the shore, being oriented almost alongside the wind. *Subject Head ings:* **1. Wave motion 2. Wave forms 3. Wind waves.**—*Trans. of authors' abstract.*

8.9–230 551.556:634.9

Runge, F., **Windegformte Bäume an der italienischen Riviera.** [Wind-deformed trees on e Italian Riviera.] *Meteorologische Rundschau*, 10(2):47–48, March/April **1957.** 6 refs. **VB**—There is an almost complete absence of wind-deformed trees between Alassio and nale Liguri. This is owing to shelter and variable wind direction. A few deformations are e to fall winds (mistral) or sea winds; examples are quoted. *Subject Headings:* **1. Wind ects on trees 2. Italian Riviera.**—*C.E.P.B.*

8.9–231 551.556.2

Kreutz, Wilhelm, and Walter, Wolfgang. **Der Strömungsverlauf sowie die Erosions-rgänge und Schneeablagerungen im künstlichen Windschirmen nach Untersuchungen im ndkanal: ein Beitrag zur Windschutzfrage.** [Stream flow-erosion processes and snow position at artificial wind breaks on the basis of studies in a wind tunnel: a contribution the wind protection problem.] *Germany. Deutscher Wetterdienst, Berichte*, 4(24), **1956.** p. 37 figs. (incl. photos), 9 tables, 8 refs. **DWB, DLC**—This experimental study aims only at an understanding of the flow properties of various artificial winds and their practical portance in protecting soil and plants against wind damage but also at clarifying some of the blems arising in wind tunnel studies. The author summarizes the principles of the ap-cation of model techniques to wind tunnel studies and then presents the experimental data l analysis dealing with measurements of *stau* profile at artificial windbreaks including the luence of surface roughness and of the absolute magnitude of the openings through which is blown upon the *stau* profile of obstacles, an analysis of flow pictures, and erosion processes l snow deposition within the effective range of windbreaks. A diagram of the wind tunnel, merous illustrations of the stream flow phenomena, graphs and numerical data are presented. *bject Headings:* **1. Wind protection 2. Wind tunnel experiments 3. Windbreaks.**—*I.L.D.*

8.9–232 551.556.8:551.465

Fel'zenbaum, A. I. (*Gov't Oceanograph. Inst.*), **Obobshchenie teorii Ekmana na sluchai ravnomernogo vetra i proizvol'nogo rel'efa dna zamknutogo moria.** [Generalization of man's theory for a case of non-uniform wind and given bottom relief of an enclosed sea.] *ademiia Nauk SSSR, Doklady*, 109(2):299–302, July 11, **1956.** 4 refs., 20 eqs. **DLC**—e problem of the determination of the type of currents brought about by wind actions in closed sea with a known coastal configuration and a given bottom relief. In the solution of s problem the following are considered: vertical exchange by the amount of motion, counter-ce friction at the bottom and slope of the sea surface covered by the waves. The wind d depending on both horizontal coordinates is considered as given; the elements to be ermined are the velocities of currents at individual horizons and levels. The equation tained is a generalization of Ekman's equation; it is

$$\frac{\partial}{\partial x}\left(\beta\frac{\partial \epsilon}{\partial x}\right)+\frac{\partial}{\partial y}\left(\beta\frac{\partial \epsilon}{\partial y}\right)+\frac{\partial}{\partial x}\left(x\frac{\partial \epsilon}{\partial y}\right)-\frac{\partial}{\partial y}\left(x\frac{\partial \epsilon}{\partial x}\right)=\mathrm{rot}_z\, mT-\mathrm{div}\, nT.$$

l it can be derived from Ekman's equation by assuming that the depth of the sea is every ere double the depth of friction. *Subject Headings:* **1. Wind driven currents.**—*I.L.D.*

UPPER AIR WINDS

See also: **Upper air winds, Greenland** (Bedel), 8.9–31; **Errors in wind aloft measurement** (Shaffer), 8.9–117; **Upper air winds** (Lamb), 8.9–157; **Ionospheric wind measurement** (Harnischmacher, Rawer), 8.9–161; **Ionospheric winds** (Kirono, Kitamura), 8.9–162; **Jet stream variations, Far East** (Hwang), 8.9–168; **Jet stream** (Dzhordzhio), 8.9–171.

8.9–233 551.557:551.555.1

Dean, Gordon A. and Palmer, C. E. (*both, Inst. of Geophysics, Univ. of Calif.*), **The need upper wind observations on the equator.** *American Meteorological Society, Bulletin*, 4):170–171, April **1956.** fig. **DWB, DLC**—A map showing the field of motion of 50,000 ft r the North Pacific for July 1955 based upon teletype data received at Hawaii is presented. analysis of the map leads to the implication that if there are any stratospheric disturbances

they will be in the belt on either side of the Berson westerlies at 5°–7°N and S. *Subject Headings:* **1. Upper air winds 2. Equatorial westerlies 3. North Pacific Ocean.**—*I.L.D.*

8.9–234 551.557:551.513.2

Kochanski, Adam and Wasko, Peter E. (*both, Hdq. Air Weather Serv., Wash., D. C.*), **Mean wind flow at the 50- and 25-mb levels.** *American Meteorological Society, Bulletin*, 37(2):61–69, Feb. **1956.** 19 figs., table, 19 refs. **DWB, DLC**—In this investigation of the mean wind flow patterns in the region of the atmosphere between 100 and 25 mb, the authors constructed mean 200, 100, 50 and 25 mb contour maps with isotherms covering North America and adjacent oceanic areas for Jan., April, July and Oct. "In July over North America, there is an abrupt change from the mean westerly flow at 100 mb to the mean easterly flow at 50 mb surface. Two maxima of westerlies appear at the 50 and 25 mb levels; one near the polar regions, the second in the subtropics." In Jan. the strong mean easterly flow over the U. S. decreases from 100 mb to the 25 mb level; in these latitudes even the mean flow at 50 and 25 mb can vary in direction, between north through N.W. to S.E. In Oct. the 100 mb shows strong westerly flow while the 50 mb can vary in direction between north, through N.W. to S.E. In October the 100 mb shows strong westerly flow while the 50 mb surface is slightly below the level where an easterly flow prevails. The 25 mb shows easterlies in the southern U. S. In April, over the U. S. the 100 mb surface shows westerlies but the transition layer is deep since both the 50 and 25 mb surface have confused resultant flow. *Subject Headings:* **1. Mean wind flow patterns 2. Upper air winds 3. Waves in the westerlies 4. North America.**—*I.L.D.*

8.9–235 551.557:551.542.1

Kukhto, A. P., **K voprosu ob otklonenii fakticheskogo vetra ot geostroficheskogo.** [Problem of the deviation of the actual wind from the geostrophic.] *Meteorologiia i Gidrologiia*, Leningrad, No. 2:19–21, Feb. **1956.** table, 8 refs. **DWB, DLC**—The author investigated the correspondence of the actual and geostrophic (i.e., excluding curvature) wind velocity in different geographic regions using charts with absolute surface topography of 850, 700 and 500 mb for July 1953 and Feb. 1954, and morning pilot balloon observations. Geostrophic wind was calculated by means of Pogosian's rule and the results for Emden, Moscow, Brest, Murmansk, etc. are given in a table. The deviations of actual from geostrophic wind velocity are independent of season. At 850 and 700 mb the actual velocity exceeds the geostrophic; at 500 mb the reverse is true. The actual wind velocity on the average exceeds by 10–15% the geostrophic velocity. *Subject Heading:* **1. Geostrophic winds.**—*I.L.D.*

8.9–236 551.557:551.510.535:551.521.67

Shuleĭkin, V. V. and Korneva, L. A., **Vliianie peremennogo potoka solnechnykh polozhitel'nykh chastits na veter v ionosfere.** [Influence of variable flow of solar positive particles on wind in the ionosphere.] *Akademiia Nauk SSSR, Doklady*, 107(1):59–62, March 1, **1956.** 2 figs., 3 refs., 14 eqs. **DLC**—The authors attempt to explain the variations of wind velocity in the ionosphere amounting to 40 to 200 m/sec and more by examining the possible existence of a relationship between electrodynamic and hydrodynamic phenomena in the ionosphere at those elevations where the increase in total charge and decrease in atmospheric density produce electrodynamic forces of similar magnitude to the total forces involved in the hydrodynamic equation. *Subject Headings:* **1. Ionospheric winds 2. Solar protons.**—*I.L.D.*

8.9–237 551.557.36

*†§U. S. Air Weather Service, **Winds over 100 knots in the Northern Hemisphere (No. 6 in a series of background reports for AWS Manual 105-50).** Its *Technical Report*, 105-121, Jan. **1955.** 67 p. 23 figs., 8 tables, 44 refs., eqs. **DWB**—All available actual observations of upper winds of 100 kn or over (not winds computed from pressure charts) between 3,000 and 60,000 ft over the entire Northern Hemisphere, uncorrected for curvature of the earth, were used to compute data presented in this analysis in tables and graphs. The data were summarized by 3 regions for latitudes above 30°N and for the entire hemisphere below 30°N. Generally the 100 kn winds were from the westerly quadrant with a maximum in Jan. and sometimes a secondary maximum in July. Very few occurred S of 30°N. The highest fre-

quency was in the East Asia sector. Winds of 150 to 200 kn or more are also analyzed. Synoptic case histories with accompanying 500, 300 or 200 mb charts are included in appendices. Shear and excessive speeds (>300 kn) are also treated. *Subject Headings:* **1. Extreme upper air winds 2. Upper air wind analysis 3. Strong upper air wind analysis 4. Northern Hemisphere.**—*M.R.*

VERTICAL MOTION

See also: **Lee waves** (Roze), 8.9–203.

8.9–238 551.558:551.577.3

Noth, H., **Vertikale Luftbewegung und Niederschlag.** [Vertical air movement and precipitation.] *Meteorologische Rundschau*, 10(2):50–51, March/April **1957.** 8 refs. **DWB**—Birds flying along shore of Bodensee glide over coastal flats. Ravens need an upward component of 2–3 m/s, and this would prevent all drops of 0.02–0.03 cm from reaching the raingage. With any wind number of larger drops entering gage is decreased. Comparative observations were made on two gages, one in a position giving little vertical motion, the other near a quay wall. The latter gave lower readings, especially in snow, unless the wind was off the land. *Subject Headings:* **1. Vertical currents 2. Precipitation variations.**—*C.E.P.B.*

8.9–239 551.558.1:551.576.1

Dufour, L. (*Inst. Royal Met., Belgique*), **Thermodynamical study of the entrainment of air into a cumulus.** *Tellus*, Stockholm, 8(2):202–205, May **1956.** 5 refs., 27 eqs. **DLC**—On the basis of a series of assumptions, the thermodynamical study of "the entrainment of air into a cumulus belongs to those adiabatic transformations of a polythermal closed system formed of a prime open system (cloud)." A mathematical treatment of the process of entrainment is presented. *Subject Heading:* **1. Entrainment in cumulus.**—*I.L.D.*

8.9–240 551.558.21

Croker, F. P. U., **Standing waves in the Vale of York.** *Meteorological Magazine*, London, 86(1019):146–148, May **1957.** fig., ref. **DWB** On Dec. 5–6, 1955, a system of standing waves lay over Dishforth area in lee of Pennines. Liverpool radiosondes show a steep lapse to about 5000 ft followed by a marked inversion. Pilots experienced strong prolonged up- and down-draughts. Synoptic conditions are discussed. *Subject Headings:* **1. Standing waves 2. Dishforth, Eng.**—*C.E.P.B.*

AQUEOUS VAPOR, HYDROMETEORS AND HYDROMETEOROLOGY

HUMIDITY

See also: **Moisture belts, Formosa** (Chen), 8.9–24; **Humidity gradient** (Elnesr), 9.9–135; **Humidity measurement by radiosonde** (Sokolov), 8.9–138; **Dew point and min. temp. forecasting** (Kozma), 8.9–146; **Upper air humidity** (Bhalotra), 8.9–178; **Humidity and temp. above grass** (Elnesr), 8.9–196; **Temp. and humidity profiles** (Osumi), 8.9–198; **Humidity-precip. relationships** (Drozdov), 8.9–259; **Water vapor flux** (Halstead), 8.9–296.

8.9–241 551.571:551.511.32

Grigor'eva, A. S., **Vlagooborot v razlichnye gody na iuge Evropeĭskoĭ Territorii SSSR.** [Moisture exchange during various years in southern European regions of the USSR.] *Leningrad. Glavnaia Geofizicheskaia Observatoriia, Trudy*, 50(112):39–47, **1955.** 2 figs., 5 tables, 3 refs., eqs. **DLC**—An analysis of the moisture exchange in the southern European territories of the U.S.S.R. and during the drought year 1946, the humid year 1945 and the relatively normal years 1947 and 1948. It is based upon a study of synoptic maps, pressure charts and aerological data. The direction of transport of moisture-forming air masses and their moisture content over the given regions was determined from the trajectories of movement of the

pressure structure and air masses. The circulation factors and the temperature and humidity playing a role in the precipitation are studied by the formula of O. A. Drozdov. A detailed account is given of the circulation and moisture regime for the normal year 1948 and the moisture regime of 1946 and 1945 are analyzed comparatively. *Subject Headings:* **1. Moisture exchange 2. Southern U.S.S.R.**—*I.L.D.*

8.9–242 551.571:620.197

*Sanyal, B. and Singhania, G. K. (*Tech. Development Estab. Lab., Kanpur*), **Atmospheric corrosion of metals, Pt. 1.** *Journal of Scientific and Industrial Research, Sec. B*, New Delhi, 15(8):448–455, Aug. **1956.** 6 figs., 6 tables, 15 refs. **DWB, DLC**—The effect of temperature, precipitation, humidity, atmospheric pollution, dew, etc., on corrosion of mild steel was studied during 1954 at Kanpur, India, and the conclusion drawn that the amount of corrosion is negligible during the dry season (due to a critical relative humidity of about 70% below which corrosion does not take place), and that it takes place very rapidly during the 7 months of the winter and rainy season. In the place where the study was made, atmospheric pollution does not have much effect. The annual rate of 0.9 mil per face for steel is 30 times as high as that for zinc. Dew, as well as rain, is an important factor. Corrosion is most rapid in fully exposed sites and least in protected places. Meteorological as well as corrosion data are presented in full. (*See* 7.2-201, Feb. **1956**, *MAB* for similar study.) *Subject Headings:* **1. Corrosion of metals 2. Humidity effects 3. Kanpur, India.**—*M.R.*

8.9–243 551.571.1:551.574.1

Gall, Ruth S. and LaMer, Victor K., **Una prueba directa de la ecuación de Kelvin que relaciona la presión del vapor con el radio de curvatura.** [Direct proof of the Kelvin equation which relates vapor pressure with the radius of curvature.] *Mexico (City). Universidad Nacional. Instituto de Geofísica, Anales*, 1:49–62, **1955.** 3 figs., 6 tables, 16 refs. **DLC**—Although Kelvin's relation (1871) predicting the increase in vapour pressure with increasing curvature is basic to colloid science, e.g., phenomena of capillarity, production and stability of colloidal systems, etc., no unambiguous direct experimental confirmation has ever been obtained. Its acceptance has rested upon the thermodynamic cogency of the derivation and the success of theories based upon it. Our direct verification is based upon an extension of the growth method of measuring the radii of monodisperse aerosol droplets initially too small for accurate determination by light scattering methods. The test involves measuring the extent to which the Kelvin relation controls under equilibrium conditions the growth of monodisperse non-volatile aerosol droplets when exposed to the vapours of a master solution consisting of the non-volatile component plus an excess of a volatile miscible solvent. Excellent quantitative confirmation has been obtained for the systems dioctyl phthalate+toluene and oleic acid+chloroform. *Subject Headings:* **1. Vapor pressure over droplets 2. Kelvin equation.**—*Authors' abstract.*

EVAPORATION AND EVAPOTRANSPIRATION

See also: **Evaporation from skin of cattle** (Berman), 8.9–97; **Global water balance** (Zubenok), 8.9–258.

8.9–244 551.573

Budagovskiĭ, A. I. and Savina, S. S., **Ispariaemost' s poverkhnosti rastitel'nogo pokrova.** [Potential evaporation from the vegetation cover.] *Meteorologiia i Gidrologiia*, Moscow, No. 8:20–23, **1956.** fig., 13 eqs. **DWB, DLC**—Using the method of heat balance which involves the solution of the equation of heat balance and of heat flow, the authors develop equation for calculating potential evaporation from a vegetation cover. It is shown that potential evaporation from a plant cover depends not only on meteorological factors but also upon the developmental stage of the plant cover, and probably also upon the type of cover. *Subject Headings:* **1. Potential evaporation 2. Evaporation from plant cover.**—*I.L.D.*

8.9–245 551.573

Demiańczuk, Piotr Paweł, **Sprawdzenie stosowalności wzoru $P=\alpha \cdot B \cdot B_1$ do obliczania miesięcznej ilosci wyparowanej wody z powierzchni wodnej, na materiale pomiarowym z**

jezior Grimnity i Werbellin. [Verification of the application of the formula $P=\alpha \cdot B \cdot B_1$ for the calculation of the monthly quantity of water in mm evaporated from the surface of water on the basis of data from measurements made on Grimnitz and Werbellin Lakes.] *Poland. Państwowy Instytut Hydrologiczno-Meteorologiczny, Wiadomości Służby,* 5(1):17–24, **1955.** 8 tables, 6 refs., eqs. Russian and French summaries p. 24. **DLC**—In applying his formula $P=\alpha \cdot B \cdot B_1$ to the monthly quantity of water in mm evaporated from the water surface, the author calculates the volume of evaporation in individual months of the year for the two lakes. The results have been found to be in good agreement with evaporation values obtained by direct measurements. *Subject Headings:* **1. Evaporation calculations 2. Evaporation from water surfaces.**—*A.M.P.*

8.9–246 551.573(437)

Fekete, Štefan, **Plošne a časove rozdelenie klimatologického výparu na Slovensku.** [Areal and temporal distribution of climatological evaporation in Slovakia.] *Vodohospodársky Časopis,* Bratislava, 1(1/2):3–34, **1953.** 7 figs., 26 refs., eqs., 14 maps. **DLC**—The fourteen maps of Slovakia presented show lines of equal evaporation for each month, for the year and for the growing season. The evaporation values were computed from precipitation and runoff data for 75 stations, and corrected with the help of temperature data for 49 additional stations. Evaporation in general, methods of its measurement, and computation techniques used in this study are discussed. *Subject Headings:* **1. Evaporation 2. Evaporation calculation 3. Slovakia, Czechoslovakia.**—*G.T.*

8.9–247 551.573:536.422 536.421

Garmendia Iraundegui, José (*Salamanca Univ.*), **La evaporación y la sublimación como procesos irreversibles.** [Evaporation and sublimation as nonreversible processes.] *Revista de Geofísica,* Madrid, 14(55):219–227, July/Sept. **1955.** fig., 2 refs., 7 eqs. English summary p. 219. **DWB, DLC**—Following L. Onsager's concepts, the author reviews the thermodynamic processes taking place under solid, liquid and gas phase during evaporation and sublimation. The conclusions are: 1) the temperature difference between the liquid and gas phase is not enough for production of evaporation or condensation; 2) to have evaporation or condensation, the vapor pressure of the gas phase must be lower than the maximum vapor pressure at the liquid phase; 3) the vapor transport per unit time from the liquid to the gas phase is proportional to the difference of the log of the vapor pressure of the liquid and gas phase; 4) if the temperature of the liquid phase is lower than the temperature of the gas phase, then evaporation or condensation will occur without any energy transfer from one phase to another. *Subject Headings:* **1. Thermodynamics of irreversible processes 2. Evaporation and sublimation.**—*M.R.*

8.9–248 551.573:551.578.46

Idzon, P. F., **Isparenie s poverkhnosti snega po nabliudeniiam v Dzhanybeke.** [Evaporation from the snow surface according to observations in Dzhanybek.] *Meteorologiia i Gidrologiia,* Leningrad, No. 2:24–26, Feb. **1956.** fig., table, 3 refs. **DWB, DLC**—The author analyzes observations on the evaporation of snow made in 1952 at Dzhanybek in the Caspian depression. Data on daily evaporation are given in a table and graph; the maximum evaporation obtained was 0.82 mm over 12 hrs. The relationships between evaporation of snow and atmospheric temperature and humidity and total snow evaporation over extended periods are discussed. *Subject Headings:* **1. Evaporation from snow 2. Dzhanybek, U.S.S.R.**—*I.L.D.*

8.9–249 551.573:551.577.38

Streiff, Abraham, **Compressed air vs. drought.** *Compressed Air Magazine,* N. Y., p. 232–235, Aug. **1955.** photos, graphs. **DWB.** Also issued as *The Reclamation Era,* Wash., D. C., 43(3):61–64, 74, Aug. **1957. DWB**—Surface waters of Lake Mead on the lower Colorado are 10° to 26° warmer than at 150 ft depth. If compressed air, such as is used to prevent freezing of surface waters in ponds and dams in the North, could be used to bring up cool water from the depths of Lake Mead, evaporation could be reduced appreciably. At 55° average loss is .057 in./day, at 67° = 0.276″/day and at 80° = .415″/day. Total loss per year is 100 in., or one million acre feet per year or 25 times the entire amount of water to be impounded behind

the new 912 ft Grand Dixence Dam in Switzerland. Caspian Sea is losing water faster than it is gaining. *Subject Headings:* **1. Evaporation from lakes 2. Evaporation from reservoirs 3. Evaporation reduction 4. Lake Mead, Colo.**—*M.R.*

CONDENSATION

See: **Vapor pressure over droplets** (Gall, La Mer), 8.9–243; **Precip. formation** (Kachurin), 8.9–260.

FOG

See: **Port operation in fog** (Colbeck et al.), 8.9–78.

CLOUDS

See also: **Cloud conf.** (Vul'fson, Levin), 8.9–52; **Entrainment in cumulus** (Dufour), 8.9–239; **Cumulonimbus development in thunderstorms** (Imianitov, Chuvaev), 8.9–319.

8.9–250 551.576.1

Charles, B. N. (*Sandia Corp., Sandia Base, Albuquerque, N. Mex.*), and Manson, H. S. (*U. S. W. B., Airport Station, Albuquerque, N. Mex.*), **Anomalous clouds at Albuquerque, N. Mexico, May 13, 1955.** *American Meteorological Society, Bulletin*, 37(2):73–76, Feb. **1956.** 4 figs. (incl. photos), table, 4 refs. **DWB, DLC**—Anomalous virga clouds observed during the morning of May 14, 1955 at Albuquerque, N. Mex., are described with the aid of photographs and their possible causes are considered. These clouds are uncommon in the absence of local storms and in the morning over the Rio Grande Valley in the vicinity. Analysis of RAOB data rules out the existence of an upper trough which might have been the cause; nor had there been any intensive raining of dust or sand within reasonable proximity to Albuquerque; also there was no abundant cirrus which would be required presumably to cause crystal fallout; and the hypothesis of cloud seeding is ruled out. *Subject Headings:* **1. Virga 2. Albuquerque, N. Mex.**—*I.L.D.*

8.9–251 551.576.1:551.521.31

Feigel'son, E. M., **Opredelenie vodnosti i vlazhnosti oblakov po pogloshchenie luchistoĭ energii.** [Determination of water content and humidity of clouds by absorption of solar energy.] *Akademiia Nauk SSSR, Geofizicheskiĭ Institut, Trudy*, 23(150):106–118, **1954.** 4 figs., 6 tables, 8 refs., 11 eqs. **DLC**—The method for determining the water content and humidity of clouds by means of absorption of radiant energy involves determining the amount of water and water vapor in a cloud along the path from source of light to receiver since radiant energy is absorbed by water vapor and water droplets. A procedure is developed for making a quantitative spectral analysis in the presence of a mixture of these two substances taking into consideration the need for separating the effect of scattering from that of absorption and the fact that BOUGUER's law is not applicable to water vapor. *Subject Headings:* **1. Water content of clouds 2. Absorption by clouds.**—*I.L.D.*

8.9–252 551.576.1:629.135.2

Molnbilding genom flygplan. [Cloud formation by aircraft.] *Tekniska Föreningens i Finland, Förhandlingar*, 63(7):167–168, July **1943.** 2 figs. **DLC**—Condensation trails behind aircraft consist of very fine ice crystals formed by condensation of the saturated hot exhaust on the soot particles of the exhaust. This condensation may contribute to cloud formation under favorable atmospheric conditions. Counter measures are discussed with stress on the military significance. Illustrations show actual formations. *Subject Heading:* **1. Condensation trails.**—*W.N.*

8.9–253 551.576.11:551.515.8

Zak, E. G. and Borovikov, A. M., **K voprosu ob evolutsii prostranstvennoĭ struktury i fazovogo sostoianniia frontal'nykh oblakov.** [The evolution of the horizontal structure and phase conditions of frontal clouds.] *Leningrad. Tsentral'naia Aerologicheskaia Observatoriia,*

Trudy, No. 7:22–38, **1952.** 8 figs., 5 refs. **DLC**—The mechanism of the dissipation of cloud systems behind fronts was studied with the aid of airplane flights carried out at Archangel during April 1950. The crystalline characteristics of the clouds involving the distribution of rain drop sizes and of ice particles encountered during each flight and the associated synoptic conditions are described. It was found that pre-frontal clouds disintegrate into individual layers with distinct boundaries soon after the passage of a front. Frontal clouds are primarily mixed in character. With the appearance of crystals, the size and number of drops diminish rapidly. At temperatures approaching 0°C the crystals falling into lower strata melt and the mixed phase is replaced by a liquid phase as a result of the mechanism of cloud disintegration. *Subject Headings:* **1. Cloud dissolution 2. Frontal clouds.**—*I.L.D.*

8.9–254 551.576.11:551.591

Zak, E. G. and Marfenko, O. V., **Struktura nizhneĭ kromki oblachnogo pokrova.** [Structure of the base of a cloud cover.] *Leningrad. Tsentral'naia Aerologicheskaia Observatoriia, Trudy*, No. 7:3–15, **1952.** 8 figs. **DLC**—The methodological and conceptual difficulties encountered in determining the height of cloud cover, in particular that of the lower boundary, are reviewed briefly as well as the need for studying the physical and synoptic characteristics of the lower cloud boundary, including its thickness, nature of visibility changes, etc. Stratus clouds with a lower boundary height up to 500 m were investigated during the fall-winter period with the aid of pilot and captive balloons. The contents include fluctuations of measurements of cloud height as measured by pilot balloons and fluctuations of the loss of horizon and of the loss of vertical visibility; the comparative height of the different levels of loss of visibility in clouds, variation of the lower margin of clouds, schematic structure of the lower cloud extension of a low cloud layer. *Subject Headings:* **1. Cloud structure 2. Visibility in clouds.**—*I.L.D.*

8.9–255 551.576.2

Rein, František (*Geophys. Inst., Czechoslov. Acad. of Science*), **Oblačnost na Milešovce v letech 1946–1955.** [Cloudiness over Milešovka, 1946–1955.] *Meteorologické Zprávy*, Prague, 9(3):74–77, June **1956.** 6 tables, 2 refs. Russian and German summaries p. 74. **DWB**—Degree of cloudiness and cloud types observed at Milešovka Observatory (1946–1955) are tabulated and briefly discussed. *Subject Headings:* **1. Cloudiness 2. Cloud types 3. Milešovka Observatory, Czechoslovakia.**—*Trans. of author's abstract.*

PRECIPITATION

See also: **Hydrologic studies, Natal** (Beard), 8.9–104; **Rainfall effects on upper air** (Drozdov), 8.9–124; **Long range precip. forecasting** (Gabilly), 8.9–148; **Vertical currents and precip.** (Noth), 8.9–238; **Compressed air vs. drought** (Streiff), 8.9–249.

8.9–256 551.577:551.501.81

Atlas, David and Kessler, Edwin, III (*both, G.R.D. Air Force Cambridge Res. Center*), **A model atmosphere for widespread precipitation.** *Aeronautical Engineering Review*, N. Y., 16(2):69–74, Feb. **1957.** 10 figs., 2 tables, 7 refs., 17 eqs. **DLC**—Three models of a "precipitation atmosphere" are presented and discussed. The radar reflectivity, drop size distribution, liquid water content, and total precipitation are worked out for the entire atmosphere from the surface to 35,000 ft. The applications of this information to calculations of jet-engine water or ice ingestion, erosion of aircraft or radomes by precipitation elements or masking of radar targets by precipitation clutter are mentioned. One model is for a semitropical atmosphere, with peak moisture at 18,000 ft; the second is for a cool atmosphere with moist adiabatic lapse rate and moisture maximum at 10,000 ft; the 3rd for a snowfall (winter storm) atmosphere with peak at 3,000 ft and a greater peak at 13,000 ft. All parameters are worked out by smooth curves for all heights and precipitation rate of 10 mm/hr also for various precipitation rates and vertical velocities. *Subject Headings:* **1. Precipitation atmosphere models 2. Radar meteorology.**—*M.R.*

8.9–257 551.577:518.2

Grunow, Johannes, **Zur Erfassung und Statistik der kleinsten Niederschläge.** [Determination and statistics of traces of precipitation.] *Geofisica Pura e Applicata*, Milan,

33:251–261, **1956.** 3 figs., 2 tables, 10 refs. English and German summaries p. 251. **DLC**—By means of logarithmic scales in statistical research on precipitation it is possible to study precipitation amounts less than 0.05 mm which can be caught by raindrop recording. In this paper the author discusses the value of the logarithmic scale, the defects inherent in the analysis of small quantities, the technique of collecting and recording small amounts of rainfall, the daily totals in single precipitation analysis; and the frequency spectrum of the smallest rainfall amounts. *Subject Headings:* **1. Traces of precipitation measurement 2. Precipitation analysis 3. Logarithmic scales.**—*I.L.D.*

8.9–258 551.577:551.573:551.581

Zubenok, L. I. (*Voeikov Geophy. Obs.*), **Vodnyĭ balans kontinentov i okeanov.** [The water balance of continents and oceans.] *Akademiia Nauk SSSR, Doklady*, 108(5):829–832, June 11, **1956.** 5 tables, 11 refs., 3 eqs. **DLC**—Using the world map of precipitation of the **Marine Atlas,** vol. 2, and a world map of evaporation the author attempts to calculate more precisely the moisture balance on the surface of the earth. Data are presented on the annual totals of water balance for 10° latitude belts, dry land, annual totals of water balance for the individual continents, annual totals of water balance for 10° latitude belts for the world ocean and latitudinal distribution of the water balance of the world in cm/year. *Subject Headings:* **1. Global water balance 2. Latitude effects.**—*I.L.D.*

8.9–259 551.577.11:551.571 551.509.324

Drozdov, O. A., **O sviazi otnositel'noĭ vlazhnosti s kolichestvom i veroiatnost'iu osadkov.** [Relation between relative humidity and the probability and amount of precipitation.] *Leningrad. Glavnaia Geofizicheskaia Observatoriia, Trudy*, 50(112):3–15, **1955.** fig., 3 tables, 10 refs., eqs. **DAWS**—The author discusses the factors determining the recurrence of precipitation; these include the conditions favoring the formation of vertical atmospheric currents, the presence of sufficient moisture in the atmosphere including the role of absolute and relative humidity in the formation of precipitation, the effect of horizontal transport (advective moisture) upon precipitation and the colloidal conditions of instability in the formation of rain. Also the influence of evaporation upon the amount and frequency of precipitation and cloudiness is considered. *Subject Headings:* **1. Precipitation formation 2. Humidity effects 3. Precipitation forecasting.**—*I.L.D.*

8.9–260 551.577.11:551.574.1

Kachurin, L. G., **Obrazovanie osadkov v oblakakh s malymi vertikal'nymi tokami.** [Formation of precipitation in clouds with small vertical currents.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz.*, No. 2:182–190, Feb. **1956.** 3 figs., 15 refs., 16 eqs. **DLC**—The growth of drops by condensation coagulation while falling through clouds with small vertical updrafts is calculated. The role of individual factors such as temperature, water content and size of cloud droplets in the growth of droplets is analyzed. The formation of precipitation is discussed. *Subject Headings:* **1. Precipitation formation 2. Drop coagulation.**—*I.L.D.*

8.9–261 551.577.2:551.577.36

Huff, F. A. (*Res. Meteorologist, Ill. State Water Survey, Urbana*), **Relation between point and areal rainfall frequencies.** *American Meteorological Society, Bulletin*, 37(5):243, May **1956.** fig. **DWB**—Results of a comparison between point and areal rainfall frequencies, using a 25 sq mi (6 gage), 50 sq mi (12 gage) and 100 sq mi (20 gage) network for 6 yrs (1948–53), are shown graphically. The highest point rainfall (at center of area) was 8.22″ compared with highest mean rainfall (for 25 sq mi) of 8.16″ for 6 yrs. The study was confined to shower rainfall. An excellent relation exists between point and areal rainfall. *Subject Headings:* **1. Point-areal rainfall frequencies 2. Rainfall frequency distribution 3. Illinois.**—*M.R.*

8.9–262 551.577.22(82)

Machado, Emilio A. M. and Marchetti, Adolfo A., **Régimen de días de lluvia en la República Argentina.** [Regime of days of rain in Argentina.] *Meteoros*, Buenos Aires, 5(4): 243–276, Oct./Dec. **1955.** 33 figs., 12 tables, 2 refs., numerous eqs. Spanish and English summaries p. 243. **DWB**—Forty-five years of rainfall data for the stations of Posadas,

Tucumán, La Rioja, Córdoba, Buenos Aires and Trelew are analyzed statistically using the probability concepts of BERNOULLI, LEXIS and POLYA. The various statistical coefficients are computed and are presented in graphs and tables. Tables giving the number of days of rain in each month and year for each station are presented. *Subject Headings:* **1. Rainfall data 2. Rainfall duration 3. Argentina.**—*I.L.D.*

8.9–263 551.577.3(52)

Higashi, Akira and Omoto, Yukio, **On the character of rainfall in the Lake Shikaribetsu Basin.** *Sapporo, Japan. Hokkaido Univ. Faculty of Science, Geophysical Bulletin*, 4:81–92, March 1956. 7 figs., 2 tables. In Japanese; English summary p. 91. **DWB**—As a part of the snow survey project in the Lake Shikaribetsu Basin in Hokkaido, precipitation over all the basin was measured through the summer season of 1954. Six integrating pluviographs of Sugaya's type were disposed in this basin and records of them gave areal distribution of the amount of every rainfall. For the statistical prediction of the amount of rainfall in this basin during the snow melt season, variability of the accumulated precipitation was calculated on the basis of data for Obihiro which is the closest weather station to the basin. The variability decreases as the period of accumulation increases, on account of the compensatory effect of precipitation over a long period. It is up to 42% for April but as little as 30% for the three-month period April–June. This means that the total amount of precipitation during the snow melt season may be predicted with reasonable accuracy. *Subject Headings:* **1. Precipitation variability 2. Shikaribetsu Basin, Japan.**—*From authors' abstract.*

8.9–264 551.577.3(437)

Rein, František, **Poznámky k ročnímu chodu proměnlivosti srážek.** [Notes on the annual march of rainfall variability.] *Meteorologické Zpravy*, Prague, 9(5/6):131–134, 1956. 4 figs., 4 tables, 4 refs. Russian and German summaries p. 131. **DWB**—An index of rainfall variability is proposed by the following formula: $I = 200\ A/R$, where I = rainfall variability index in percent; A = mean variability, i.e., the arithmetic mean of absolute values of deviations of monthly total rainfall amounts from their 25-yr averages; and R = average total rainfall amount. Monthly values of I are tabulated and graphically presented for six stations in Bohemia and Moravia (1926–1950). Mean variability and amplitude of monthly totals are also tabulated. Regional distribution of I in Bohemia and Moravia is shown in a chart. The effect of orography on rainfall variability is discussed on the basis of the values presented. *Subject Headings:* **1. Rainfall variability 2. Czechoslovakia.**—*G.T.*

RAIN, SNOW AND HAIL

See also: **Halos and ice crystals, Maudheim** (Liljequist), 8.9–21; **Drop size distribution** (Krasnogorskaia), 8.9–111; **Chem. composition of rainwater** (Junge, Gustafson), 8.9–149; **Hail forecasting** (Jacobson), 8.9–175; **Hail squalls, Cape ras-el-Had** (Rodewald), 8.9–222; **Evaporation from snow** (Idzon), 8.9–248; **Electrification of graupel** (Reynolds et al.), 8.9–323.

8.9–265 551.578.11

Soudain, Y., **Analyse polarographique de l'eau de pluie. Dosage du calcium.** [Polarographic method of calcium determination in rainwater analysis.] *Journal Scientifique de la Météorologie*, Paris, 3(11):102–106, April/June 1951. 2 figs., 7 refs. **Pt. 2,** *Ibid.*, 5(17):16–20, Jan./March 1953. **DWB**—Using the method suggested by P. SOUCHAY and M. S. PEINTRE for quantitative determination of Ca in rainwater by the polarographic method, using chloranilic acid introduced in excess with pH = 5 as a reagent, the author (in Pt. 2) analyzed rainwater samples obtained at Trappes, France (Feb. 1950 to Sept. 1951) and compares results of Ca determination with K and Mg content of these samples mentioned in Pt. 1. Chart shows graphically that for each rainfall the Na content is greater than the Ca or Mg content, but the Ca content is usually > twice as great as the Mg. In sea water the ratio of Ca/Mg is about 3–1. The method of G. BERTRAND (1943, 1947) is not applicable to measurement of Ca and Mg content of individual falls of rain, but only to the average content of a number of falls. *Subject Headings:* **1. Rainwater analysis 2. Calcium content of rainwater 3. Trappes, France.**—*M.R.*

8.9–266 551.578.4(52)

Misawa, Zin-ichi, **On the heavy snowfall in Shimane Prefecture.** *Journal of Meteorological Research*, Tokyo, 6(9):458–460, **1954.** 3 figs., 3 tables, 2 refs. In Japanese. **DWB**—Items such as pressure distribution favourable for heavy snowfall, relation between the difference of air temperature and sea surface temperature and the amount of precipitation, distribution of snowfall, are synoptically discussed. *Subject Headings:* **1. Synoptic conditions for snowfall 2. Shimane Prefecture, Japan.**—*H. Arakawa.*

8.9–267 551.578.41:551.509.54(521.15)

Ishiyama, K. and Sato, Z., **On the mechanism of snowfall.** *Journal of Meteorological Research*, Tokyo, 5(6):511–515, July **1953.** 6 figs., 3 tables. In Japanese; English summary p. 511. **DWB**—The mechanism of snowfall in Yamagata Prefecture is derived from radiosonde data and surface observations for purposes of forecasting snowfall. The following results are obtained: (1) Snowfall seems to occur when temperature at the 700 mb level is below −9°C and surface temperature below 3°C. (2) In these cases mixing ratio decreases, relative humidity increases and on days with snowfall supersaturation takes place around ice crystals. (3) On days with snowfall in winter atmospheric conditions are remarkably unstable. (4) At the time of snowfall, in general, the 850–700 mb thickness becomes smaller than it is on other days. *Subject Headings:* **1. Snow mechanics 2. Snowflake formation 3. Snowfall forecasting 4. Yamagata Prefecture, Japan.**—*Authors' abstract.*

8.9–268 551.578.46:628.1

Uryvaev, P. A., **Vodootdacha iz snega v pole i lesu.** [Water supply from snow in field and forest.] *Meteorologiia i Gidrologiia*, Leningrad, No. 4:36–39, July/Aug. **1955.** 2 figs., 2 tables, ref., eq. **DWB**—The apparatus for measuring the water yield from snow is described with the aid of a diagram. The results of measurements of water yield from snow carried out at different exposures in open fields and forests are presented. A relationship is established between water yield and temperature; namely,

$$\int_u^T h dT = k \int_0^T t dt,$$

where h = water yield, T = time, and t = air temperature. *Subject Heading:* **1. Water supply from snow.**—*I.L.D.*

HYDROMETEOROLOGY

See also: **Chem. analysis of water** (Alekin), 8.9–17.

8.9–269 551.579

Penman, Howard Latimer (*Rothamsted Experimental Station, Harpenden, Eng.*), **The water balance of catchment areas.** *I.U.G.G. International Association of Scientific Hydrology, Brussels*, 1951, [*Transactions*], 3:434–442, **1952.** 3 figs., 12 refs. **DWB**—A valuable attempt to study the water balance of catchment areas (Stour, Thames at Teddington) from month to month, computing the evaporation from the heat balance of the Earth's surface and the change in storage from precipitation runoff and soil moisture deficit, which depends on a root constant. Results show good agreement with well level data. Distribution of evapotranspiration over the British Islands is shown on a map. *Subject Headings:* **1. Hydrologic cycle 2. Evapotranspiration 3. Stour catchment, Great Britain 4. Thames catchment, Great Britain.**—*A.A.*

8.9–270 551.579:06

Schnackenberg, Ellis C. (*Soil Conservation and Rivers Control Council, N. Z.*), **Hydrologic data, Part I. Rainfall and runoff. Part II. Gauging structures.** *Commonwealth Engineer*, Melbourne, (Reprinted from) Jan. and Feb. issues, **1953.** 12 p. 5 figs., 2 tables, 3 refs. **DWB**—Practically no data are presented in this report, but the history, the present arrangement and intentions of hydrologic research in New Zealand are summarized. All this work is centralized since 1946 under the Soil Conservation and Rivers Control Council in Wellington.

As the normal period for precipitation averages, the interval 1901–30 is adopted, studies are made for excessive rainfall and a flood warning service is established. The hydrometric equipment is described in more detail. *Subject Headings:* **1. Hydrologic services 2. Hydrometeorological research 3. New Zealand. I. New Zealand, Soil Conservation and Rivers control council.**—*A.A.*

8.9–271 551.579:63(02)

†Schroeder, Gerhard, **Landwirtschaftlicher Wasserbau.** [Agricultural hydrology.] 2nd rev. ed. Berlin, Springer-Verlag, **1950.** 510 p. 372 figs., 176 tables, 278 refs. *Handbibliothek für Bauingenieure*, Berlin, Vol. 3, Pt. 7. **DLC**—Most of this book, which summarizes in concise form the German scientific literature on agricultural hydrology, melioration, drainage and irrigation, is devoted to engineering aspects. The meteorologist will find an excellent treatment of soil physics and chemistry (especially soil moisture, air content, permeability, water and heat balance, the energy theory of soil water, pM content, classification of soils, etc.). The growth conditions of plants in relation to light, heat, water and air are outlined. About 90 pages deal with general meteorology and hydrology (precip. and its measurement, evaporation, ground water, runoff, winds). The bibliography is entirely limited to German works. *Subject Headings:* **1. Agricultural hydrology 2. Soil physics 3. Soil moisture 4. Textbooks.**—*A.A.*

8.9–272 551.579:628

*Searcy, J. K.; Baker, R. C. and Durum, W. H., **Water resources of the St. Louis Area, Missouri and Illinois.** *U. S. Geological Survey, Circular*, 216, 1952. 55 p. 23 tables, 31 figs., plate (fold.), bibliog. p. 55. **DWB**—In the introduction to this compilation of surface and ground water data for rivers in the St. Louis region, there is a brief summary of the climate of the area, and graphs based on 78 yrs of record, showing the daily mean maximum, minimum and average temperatures, the mean, maximum and minimum monthly precipitation and the frost free growing season (average and extreme). Data of major floods at Alton for period 1844 and 1890–1951 are given. The report is mostly analytical. *Subject Headings:* **1. Floods 2. Water resources 3. St. Louis, Missouri Area.**—*M.R.*

8.9–273 551.579:551.525.4(775)

Sheerar, Louis L., **A progress report on hydrologic research in the Wisconsin River Valley.** *Western Snow Conference, Proceedings* 1948, p. 77–81, Feb. **1949.** 3 figs. **DWB**—Hydrologic research was begun in a small way in Wisconsin in 1907, and the work was expanded in 1939 when a program of research into the correlation of hydrologic factors with stream regulation was begun. A complete station was established at Rainbow Reservoir with many types of rain gages; humidity and temperature records made at several levels above and below ground; evaporation pans, and so forth. Eleven years of records are available. *Subject Headings:* **1. Hydrometeorological research stations 2. Soil temperature data 3. Wisconsin.**—*M.R.*

8.9–274 551.579

Simons, W. D. (*U. S. Geolog. Survey, Tacoma, Wash.*), **Concept and characteristics of base flow in the Columbia River basin.** *Western Snow Conference, 21st, Boise, Idaho, April* 1953. p. 57–61. 4 figs. **DWB**—Shows how to construct the base flow depletion curve for dry weather from summer and winter hydrographs (Salmon River), discussing also the effect of temperature and precipitation. *Subject Headings:* **1. Depletion curves 2. Base flow 3. Salmon River 3. Idaho.**—*A.A.*

8.9–275 551.579:58

Skibniewski, Leonard, **Zagadnienie rosliny w gospodarce wodnej.** [The problem of plants in water economy.] *Gazeta Obserwatora PIHM*, Warsaw, 4(12):1–4, Dec. **1951.** 2 figs. **DWB**—The author maintains that the most striking effect of vegetation on hydrological conditions is due to its covering of surface waters. He then describes the consecutive processes of overgrowing of lakes, of improving of land by silt deposition and finally discusses the influence of vegetation upon hydrological conditions. It is shown that vegetation appreciably affects

the water balance and that this influence can be positive (forest shelter belts) as well as negative (swamps and peat bogs). *Subject Headings:* **1. Hydrologic cycle 2. Vegetation influences.** —*A.M.P.*

8.9–276 551.579

*South Africa. Dept. of Irrigation, **Report on stream flow variation.** *I.U.G.G. International Association of Scientific Hydrology, Brussels*, 1951, [*Transactions*], 3:278–284, **1952.** 5 tables. **DWB**—Average, maximum and minimum annual runoff given for 15 rivers in South Africa, as well as mean runoff for 2–4 successive dry years. Data for each month of the period 1925/26–1944/45 given for 4 discharge stations. *Subject Headings:* **1. Runoff data 2. Union of South Africa.**—*A.A.*

CLIMATOLOGY AND BIOCLIMATOLOGY

CLIMATOLOGY

See also: **Climat. conf.** (Senkowski), 8.9–51; **Climat. bibliog.** (U. S. W. B.), 8.9–61; **Distribution of frontal zones** (Khromov), 8.9–182.

8.9–277 551.58:378

Futó, József, **Az éghajlattanítás elvi kérdései.** [Basic problems of education in climatology.] *Földrajzi Közlemények*, Budapest, 79(4):349–358, **1955. DLC**—In the various school curricula the climate of a region is usually dealt with by enumerating a few temperature and precipitation data. Such abstract data are uninformative and hard to memorize. The author therefore suggests that the climate of a region should be treated by considering a) constituent elements of climate, b) distribution of climatic factors in time and space and c) climatic classification of the region. *Subject Heading:* **1. Teaching of climatology.**—*G.T.*

8.9–278 551.58:63

Havens, A. Vaughan (*Dept. Met., Rutgers Univ.*), **Agricultural climatology in the northeast.** *Weatherwise*, Boston, 9(5):175, Oct. **1956. DWB**—A regional research project entitled the **Application of Climatology to Northeastern Agriculture** was inaugurated early in 1956 by the U. S. W. B. and U. S. Dept. of Agriculture in cooperation with the state agricultural experiment stations in the northeastern states. Cooperative arrangements between the states and the U. S. W. B. are being worked out to put all cooperative weather records on punched cards as far back as 1926. The Northeastern Technical Committee on Agricultural Climatology, with representation from each cooperating agency, met on Sept. 6–7, 1956 at the Univ. of Maryland to standardize procedures. *Subject Headings:* **1. Agroclimatology research 3. Northeastern United States.**—*M.R.*

8.9–279 551.58:62

Schulze, W. M. H. (*Berlin*), **Technoklimatologie.** [Techno-climatology.] *Die Technik*, Berlin, 11(2):112–115, Feb. **1956.** 48 refs. **DLC**—A review of recent work and literature on the corrosion of metals and materials used in communications, power transmission and industry, as examples of 3 types of techno-climatology: 1) Werkstoffe or materials climatology, 2) Betriebsmittel or equipment climatology and 3) Betriebsvorgange or operations climatology in an analogy to the different branches of bioclimatology. *Subject Headings:* **1. Applied meteorology 2. Technoclimatology 3. Corrosion of metals.**—*M.R.*

8.9–280 551.58:6

Veryard, R. G., **The application of climatological data.** *Meteorological Magazine*, London, 86(1021):202–206, July **1957. DWB**—Climatological work of British Meteorological Office goes back to the foundation of the Office in 1855. Requirements for a climatological consultant service are set out. Shortcomings are being removed by the use of punch cards. *Subject Heading:* **1. Applied climatology.**—*C.E.P.B.*

CLIMATIC ZONES

See: **Latitude effects on global water balance** (Zubenok), 8.9–258.

8.9–281 551.581:551.521

Godson, W. L., **Atmospheric radiation, with applications to Polar regions.** (In: Russell, Pamela and Ballabon, M. B., eds., **Informal papers in Arctic meteorology.** McGill Univ. Arctic Meteorological Group, Contract AF 19(604)-1141, Scientific Report, No. 1, Dec. 15, **1955.** p. 7–13. 6 refs.)—A general description is given of the radiation climatology research program being carried out in Canada. The author discusses the various types of computed cloudless day radiation data and charts constructed therefrom; the empirical equations for calculating the fraction of cloudless day radiation from sunshine duration for southern Canada, and from average cloudiness for northern Canada; and an instance of infrared radiative cooling, namely the formation and maintenance of fog at very low temperatures illustrated by the fog at Watson Lake, Yukon Territory. *Subject Headings:* **1. Radiation climatology 2. Atmospheric radiation 3. Low temperature fog formation 4. Watson Lake, Yukon Territory 5. Canadian Arctic.**—*I.L.D.*

CLIMATE OF PARTICULAR PLACES

See also: **Climatic atlas, Brazil,** 8.9–14; **Atlas, Sweden,** 8.9–15; **Mediterranean Pilot** (Gt. Brit. Hydrographic Dept.), 8.9–18; **Climate, Central Massif, France** (Estienne), 8.9–25; **Climate of Fr. Equatorial Africa,** 8.9–26; **Climate, Greenland Ice Cap** (Georgi), 8.9–33; **Climate, Antarc.** (Iriart), 8.9–37; **Climate, Antarc.** (Kosack), 8.9–38; **Climate of Fr. Guiana,** 8.9–144.

8.9–282 551.582:008(422)

McCormick, R. A., **Climate and culture in North Surrey.** *Weather*, 12(6):183 187, June **1957.** ref. **DWB**—An American view. The weather is mild, moist and changeable. Statistics are quoted for Kew. Agriculture is mainly a hobby. Architecture, heating, clothing, food, recreation and transport are described. *Subject Headings:* **1. Local climate 2. Culture 3. Surrey, Eng.**—*C.E.P.B.*

8.9–283 551.582(437)

Petrek, Jozef, **Náčrt klímy Skalnatého Plesa na základe 15 ročného pozorovania.** [Climatic summary of Skalnaté Pleso from 15 years of observation.] *Meteorologické Zpravy*, Prague, 9(5/6):114–122, **1956.** 3 figs., 13 tables, 6 refs. Russian and German summaries p. 114. **DWB**—Data on temperature and its interdiurnal variability, on humidity, atmospheric pressure, wind, precipitation, cloudiness and insolation are tabulated and graphically presented for Skalnaté Pleso (49N, 20E, el.: 1778 m) for a 15-year period. *Subject Headings:* **1. Local climatology 2. Skalnaté Pleso, Czechoslovakia.**—*Trans. of author's abstract.*

8.9–284 551.582.2(95)

*Braak, Cornelius, **Klimaat.** [Climate.] (In: Klein, W. C. (*ed.*), **Nieuw Guinea.** 'S-Gravenhage, **1953.** p. 42–66. charts, tables, 9 refs. English summary p. 56.) **DLC**—This concise and comprehensive survey of the climate of Netherlands New Guinea contains a brief account of the circulation factors producing the climatic characteristics and a detailed analysis of the precipitation, temperature and wind and the role of topography in determining their distribution is stressed. Also the climate of Australian New Guinea is described briefly. Meteorological data are presented in the text but the appendix contains mean monthly and annual rainfall amounts for all stations on the entire island of New Guinea, and charts showing atmospheric pressure and wind for Jan. and July; temperature, cloudiness and rainfall during similar months. *Subject Headings:* **1. Climate of New Guinea 2. Climatic data 3. New Guinea.**—*I.L.D.*

8.9–285 551.582.2(44)

*Heynard, F., **Contribution à l'étude du climat Bordelais.** [Contribution to the study of the climate of Bordeaux.] *La Météorologie*, Paris, Ser. 4, No. 43:267–278, July/Sept. **1956.**

2 figs., 9 tables, 3 refs. French, English and Spanish summaries p. 267. **DWB**—Elaborate statistical analysis of climatic data for the S.W. Agricultural Research Station at Pont-de-la-Maye in the Gironde (1924–1953). Rainfall, excessive rains, long rainy periods, droughts, areal distribution of rainfall, humidity, fogs, temperature, temperature extremes, days with frost, hoar frost and frozen soil, hot days, degree days, sunshine, wind, snow, thunderstorm and hail are the elements discussed and illustrated by analytical tables and graphs. *Subject Headings:* **1. Climate of Bordeaux 2. Climatic data 3. Pont-de-la-Maye, Gironde 4. Bordeaux, France.**—*M.R.*

8.9–286 551.582.2(54)

*Ivanov, N. N., **Klimaticheskaia kharakteristika shtata Madkhiia Pradesh v Indii.** PClimatic characteristics of the state of Madhya Pradesh in India.] *Vsesoiuznoe Geograficheskoe Obshchestvo, Leningrad, Izvestiia,* 88(1):30–43, Jan./Feb. **1956.** fig., table. **DLC**—A descriptive climatology of the State of Madhya Pradesh consisting entirely of discussion with climatic data interspersed in the text. After a brief account of the physical geography of this area accompanied by a map, the author discusses the radiation balance, atmospheric circulation, atmospheric temperature, cloudiness, relative humidity, atmospheric precipitation, evaporation; local balance of atmospheric humidity and local atmospheric humidity within the boundaries of the state; climatic seasons, the humid and warm period, the cool dry period, the hot dry period; and interannual variability of precipitation. A table presents comparative climatic data for Nagpur (in central part of the state) and for Moscow. *Subject Headings:* **1. Climate of Madhya Pradesh, India 2. Climatic data 3. Madhya Pradesh, India.**—*I.L.D.*

8.9–287 551.582.2(673)

Queiroz, Dario Xavier de (*Head, Sec. of Climatology, Angola Met. Service*), **Valores médios mensais e anuais representativos de elementos climáticos em Angola.** [Monthly and annual means of climatic elements in Angola.] Luanda, **1955.** 8 p. map, 3 tables (fold.), foot-refs. **DWB**—A study of representativeness of 5, 10 and over 10 yr records for 13 stations and 11 more precipitation stations in Angola revealed that a 5 yr record of monthly or annual average pressure, temperature, relative humidity, wind, cloud, sunshine and evaporations is sufficient, whereas for precipitation, a 10 yr record is the least (for stations with low variability) and a much longer record for stations with high coefficient of variability. Tables show differences between 5 or 10 yr records and long (up to 54 yrs) period records for each element at each station. Both mean and extreme differences are compiled. The study is considered of general application to climatic maps for tropical regions. *Subject Headings:* **1. Representativeness of short period records 2. Climatic mapping 3. Angola.**—*M.R.*

8.9–288 551.582.2(438)

*Timashev, A. K., **Pol'skoe pomor'e i ego sotsialitsicheskaia rekonstruktsiia.** [The Polish coastal region and its socialist reconstruction.] *Akademiia Nauk SSSR. Institut Geografii, Trudy,* No. 59:42–87, **1954.** 3 figs., 4 tables, refs. **DLC. Fiziko-geograficheskaia kharakteristika.** [Physico-geographical characteristics], p. 42–56. The section on the physical geographical features of the Polish coastal region along the Baltic Sea contains a description of the climate. A general account of the circulation over this region and a discussion of temperature and precipitation (and vegetation period). Mean values for these variables are given in the text and a table gives, for selected stations, mean Jan., July and annual temperatures, duration of temperatures, in days above 0° and 5°C, annual amplitude of temperature and amount of precipitation. *Subject Headings:* **1. Climate of Polish coastal regions 2. Poland.**—*I.L.D.*

CLIMATIC CHANGES

See also: **Marine climat. oscillations** (Rodewald), 8.9–83.

8.9–289 551.583:581.056:634.94

Huber, Bruno and Jazewitsch, Witz von (*both, Forstbotanisches Inst., Munich*), **Tree-ring studies of the Forestry-Botany Institutes of Tharandt and Munich.** *Tree Ring Bulletin,*

Tucson, Arizona, 21(1/4):28–30, April 1956. table, 26 refs. **DWB**—The variability of tree ring widths in Central Europe is not so large as in the American Southeast. It is determined by both temperature and precipitation, depending on the specific location of the tree. A considerable worsening of the climate after the year 1700 was found for the Berchtesgaden region. *Subject Headings:* **1. Dendroclimatology 2. Tree ring widths 3. Central Europe 4. Berchtesgaden, Germany.**—*A.A.*

8.9–290 551.583:551.509.67

Ives, Ronald L., **Vegetative changes at Pinacate, Sonora, Mexico.** *Science*, Wash., D. C., 122(3182):1235, Dec. 23, **1955.** fig., 4 refs. **DLC**—The barren area of Pinacate, Sonora (at the NE tip of the Gulf of Calif.) has become green during the past decade. Possible explanations are: 1) increase in annual precipitation; 2) decrease in cloudburst type precipitation; 3) increase in winter rainfall, and 4) extinction of mountain sheep and wild burros in the area. It is also suggested that cloud seeding in recent years in the mountains east of San Diego could have produced this change in the rainfall regime. Evidence for the 4 factors listed above is cited. *Subject Headings:* **1. Climatic variations 2. Cloud seeding effects 3. Sonora, Mexico.**—*M.R.*

8.9–291 551.583:581.056

Mikola, Peitsa (*Dept. of Silviculture, Helsinki Univ., Finland*), **Tree-ring research in Finland.** *Tree-Ring Bulletin*, Tucson, Arizona, 21(1/4):16–20, April **1956.** 3 tables, 16 refs. **DWB**—Dendroclimatology in Finland dates from 1920, when LAITAKARI published a study on the effect of weather conditions on the height and diameter growth of pine. Especially important are four National tree surveys, which show the effect of climatic variations, mainly of the summer temperature. Correlations for different latitudes and longitudes are shown, including the timber line. *Subject Headings:* **1. Dendroclimatology 2. Finland.**—*A.A.*

8.9–292 551.563.14:551.311.12(786)

Dightman, Richard A. (*U. S. W. B., Helena, Montana*), **Grinnel glacier studies: a progress report as related to climate.** *Monthly Weather Review*, Wash., D. C., 84(9):329–332, Sept. **1956.** 2 figs., 4 tables, 9 refs. **DWB, DLC**—Additional data obtained on Grinnell Glacier in Glacier National Park, Mont., from 1952 through 1956 show that the cold wet cycle begun in 1946 has continued, attended by advancing glaciers—a reverse of the trend from 1916 through 1945, during which the glaciers receded markedly. (*See* 4.4–239, April 1953, *MAB.*) Temperature and precipitation data for region are shown by means of 10-yr moving averages and the actual annual data presented in a table. The trends are shown to be general for the area (Montana) and not just local effects. They also agree with trends on Mt. Baker in Washington State. *Subject Headings:* **1. Glacier variations 2. Climatic variations 3. Grinnell Glacier, Montana 4. Glacier National Park, Mont.**—*M.R.*

8.9–293 551.311.13:551.583.3

Markov, K. K., **Antigliatsializm.** [Antiglacialism.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geogr.*, No. 1:74–86, Jan./Feb. **1955.** 24 refs. Also: Makeev, P. S., **Po povodu kritiki antigliatsializma.** [Apropos of a criticism of antiglacialism.] *Ibid.*, No. 6:69–76, Nov./Dec. **1955.** 6 refs. **DLC**—In an extensive review of the evidence (climatic, geomorphologic and faunal) for and against continental glaciation in Eurasia, MARKOV concludes that MAKEEV's school of antiglacialism is not in keeping with the extreme proponents of glacialism but in agreement with the factual (climatic and paleontological) data and theory of Quaternary glaciation. In the second paper MAKEEV criticizes MARKOV for basing his criticism of antiglacialism on paleontological arguments. MAKEEV argues polemically for the insufficiency of climatic conditions to have brought about the continental glaciation during the Quaternary, since it is impossible to assume the existence of eternal frost within middle latitudes. Climatic and geomorphologic arguments from northwest Europe and continental Russia presumably confuting the proponents of Quaternary glaciation are presented. *Subject Headings:* **1. Quaternary period 2. Glaciation.**—*M.R., I.L.D.*

8.9–294 551.583.7

Rukhin, L. B., **Klimaty proshlogo.** [Climates of the past.] *Vsesoiuznoe Geograficheskoe Obshchestvo, Leningrad, Izvestiia,* 87(2):105–119, March/April **1955.** 8 maps (7 fold), 26 refs. **DLC**—The geologic evidence for climatic change in the past and for the teutonic origin of climatic change is reviewed. The distribution of organisms and mineral deposits indicating climatic change in the present geological age, and during the Tertiary, Cretaceous, Upper Paleozoic, Devonian and Cambrian periods are shown on maps. The possible climate and the positions of poles and equator are described. Evidence for a shift in the axis of rotation of the earth as a result of shifts in the earth's mass is presented. *Subject Headings:* **1. Climatic changes 2. Geological climates.**—*I.L.D.*

MICROCLIMATOLOGY

See also: **Clothing for glider pilots** (Kuettner), 8.9–74; **Plastic greenhouses** (Allerton), 8.9–96; **Alpine afforestation** (Aulitzky), 8.9–103.

8.9–295 551.584:631.44(439.1)

*Wischán, Zoltán, **Mikroklímakutatás békési szikeseken.** [Microclimatic research in the alkaline soils of Békés.] *Földrajzi Értesítő,* Budapest, 5(1):43–53, **1956.** 6 figs., 8 tables, 8 refs. Russian and German summaries p. 53. **DLC**—Results of microclimatic measurements made at five stations near Békéscsaba on Aug. 14 and 15, 1954 are presented and discussed. The measurements included atmospheric temperature at 5, 50 and 150 cm, soil temperature at 2, 5, 10 and 30 cm (at 4 stations), atmospheric humidity at 50 cm and evaporation at 5 and 50 cm. Atmospheric temperature was measured every 15 min, the other elements every hour, day and night. Three of the stations were located in alkaline soil, two in sandy clay. Detailed data on the composition and stratification of the soil at each station are given. The measurements show that warming is greater and heat storage better in the alkaline soils; atmospheric temperature is higher over alkaline soils, both day and night. *Subject Headings:* **1. Microclimatic research 2. Soil types 3. Hungary.**—*G.T.*

8.9–296 551.584.1:551.524.1:551.554:551.571.1

Halstead, Maurice H., **The fluxes of momentum, heat, and water vapor in micrometeorology.** *Johns Hopkins Univ. Laboratory of Climatology, Publications in Climatology,* 7(2):326–358, **1954.** 23 figs., 2 tables, 2 refs., 85 eqs. Append. p. 359–361. **MH-BH**—A systematic development of equations for a rational computation of the heat budget, based on data obtained on the O'Neill expedition. The discussion starts with relevant aspects of the kinetic theory of gases, laminar flow, flux of momentum and proceeds to effects of surface roughness. The author considers now the effect a vertical gradient in shearing stress as negligible for micrometeorological purposes. Surface drag measured in the field compares well with the theory. An analysis of smoke puff diversions was made, suggesting that the concept of distorted surfaces might substitute vertical and horizontal variations of the exchange coefficient. Further thoughts and evaluations are devoted to temperature profiles, heat flux and water vapor flux. The percentage of heat used for evaporation is closely related to soil moisture. *Subject Headings:* **1. Micrometeorological profiles 2. Profiles of meteorological element 3. Turbulence theory.**—*A.A.*

8.9–297 551.584.42:551.524.1(425)

Norman, M. J. T.; Kemp, Mrs. A. W. and Tayler, Mrs. J. E., (*all, Grassland Research Institute, Hurley, Berkshire*). **Winter temperatures in long and short grass.** *Meteorological Magazine,* London, 86(1019):148–152, May **1957.** 2 figs., 5 tables. **DWB**—Continuous records of temperature 1″ above soil, Nov.–March 1953/4 and 1954/5, were obtained in herbage 12–18″ tall and 1″ tall, on a chalk slope facing NW 180 ft above Thames valley. In short grass compared with long, mean temperature was slightly lower, maximum 2–3°F higher, minimum 2–3°F lower and frosts more frequent. General night temperature had a high negative correlation with excess of night temperature in long over short grass. Causes are discussed and difference expressed in terms of mean temperature and days from Jan. 13. *Subject Headings:* **1. Field microclimatology 2. Grass temperatures 3. Hurley, Eng.**—*C.E.P.B.*

CLIMATIC CLASSIFICATION

See also: **Climatic regions, Formosa** (Chen), 8.9–24; **Alpine afforestation** (Aulitzky), 8.9–103; **Arid climates** (Fel'dman), 8.9–304.

8.9–298 551.585.5:631.58

Dickson, B. T. (*member, UNESCO Advisory Com. on Arid Zone Res., Canberra, Australia*), **The challenge of arid lands research and development for the benefit of mankind.** (In: White, Gilbert F. (*ed.*), **The future of arid lands.** Wash., D. C., American Association for the Advancement of Science, **1956.** p. 47–64. 4 refs.) **DLC**—The application of scientific and technological knowledge to an understanding of desert conditions and to the solutions of the ecological problems presented by them is discussed. The author considers the problem of the distribution of precipitation and the underground water regime. Two examples from Tunisia, the reclamation of a desert area under the auspices of the Thal Development Authority in the Punjab, and the solution of the salinity problems; soil characteristics of arid regions and the various problems that must be solved before they can be utilized properly; the development of a suitable plant cover; adaptation of man and animals to desert climates, etc. *Subject Headings:* **1. Arid zones 2. Arid zone agriculture 3. Desert climatology.** *-I.L.D.*

8.9–299 551.311:551.585.55

Lilienberg, D. A., **Formy podzemno-erozionnogo rel'efa iugo-vostochnogo Kavkaza.** [Forms of underground erosional relief of southeastern Caucasus.] *Akademiia Nauk SSSR. Institut Geografii, Trudy,* No. 65:147–172, **1955.** **DLC**—This analysis of the factors determining the development of underground erosional relief in the southeastern Caucasus discusses the role of the semiarid climate in the formation of the clayey pseudokarst. A brief description is given of the semiarid and steppe climate prevailing in the foothills of this region. *Subject Headings:* **1. Underground erosional relief 2. Semiarid climates 3. Steppe climates 4. Southwestern Caucasus.**—*I.L.D.*

BIOCLIMATOLOGY

See also: **Plastic greenhouses** (Allerton), 8.9-96; **Wheat yields, W. Australia** (Gentilli), 8.9–98; **Quality of wheat, France** (Geslin), 8.9–99; **Banana growing, W. Australia** (Kirkwood), 8.9–100; **Health resort climatology** (Mörikofer), 8.9–110.

8.9–300 551.586:581.5

Hudson, J. P., **Control of the plant environment.** *Nature,* London, 179(4571):1173–1175, June 8, **1957.** **DWB**—Account of University of Nottingham Easter School on **Control of environment in crop experimentation,** April 15–17, **1957.** S. J. Wellensiek opened the proceedings by describing plant and environment in general terms, including weather factors. Changes affected by temperature, day-length and illumination were discussed by other speakers. Light, wind and water were then considered separately. Technical aspects of environment control (glasshouses and growth cabinets) were next considered, and finally prospects of increasing crop yields. Equipment and applications of environmental control were demonstrated. Proceedings will be published in full. *Subject Headings:* **1. Plant ecology 2. Bioclimatology of plants.**—*C.E.P.B.*

8.9–301 551.586:612.014.43

Medvedeva, N. B.; Ermakov, N. V.; Kmit, G. I. and Bobok, T. E., **Vliianie letnikh klimaticheskikh uslovii iuga Ukrainy na organizm kolkhoznikov v period raboty.** [Effect of summer climate conditions of the southern Ukraine upon members of collective farms during work.] *Gigiena i Sanitariia,* Moscow, 21(4):15–22, April **1956.** 2 figs., table, refs. **DLC**—The effect of the hot dry steppe climate prevailing in the southern Ukraine upon 440 working farmers was studied experimentally by examining the variations of the following physiological characteristics: body and skin temperatures, sweat production on the forehead, on the chest and on the back, pulse rate and blood pressure The observations on the relationship between skin temperature and weather type blood pressure, air temperature and on skin temperature, sweat production and body temperature during different types of weather are presented in

graphs and in a table. *Subject Headings:* **1. Physiological climatology 2. Heat effects on man 3. Body temperature 4. Skin temperatures 5. Ukraine.**—*I.L.D.*

UPPER AIR CLIMATOLOGY

8.9–302 551.587(42)

Bannon, John K., **Some British work in upper air climatology.** *Germany. Deutscher Wetterdienst, Berichte,* 4(22):117–123, **1956.** 15 figs., 19 refs. **DWB, DLC**—A summary of British work of mapping the mean characteristics of the atmosphere up to the 100 mb level and assessing the degree of variations about the means. With the aid of numerous charts the author discusses the characteristics of mean temperature and variation about the mean at various specified pressure levels, mean wind flow including jet stream studies and the effective period of upper air statistics. *Subject Headings:* **1. Upper air climatology 2. Jet stream studies 3. England.**—*I.L.D.*

ENVIRONMENTAL INFLUENCES

See also: **Mountain met.** (Schaefer), 8.9–127; **Radiation on variously oriented slopes** (Becker, Boyd), 8.9–191; **Topographical effects on wind speed and direction** (Tabata), 8.9–211.

8.9–303 551.588:634.94

Eklund, Bo, **Årsringsbreddens klimatiskt betingade variation hos tall och gran inom norra Sverige åren 1900–1944.** [Variations in the widths of the annual rings in pine and spruce due to climatic conditions in northern Sweden during the years 1900–1944.] *Statens Skogsforskningsinstitut, Meddelanden,* 44(8):1–150, **1954.** Also: Excerpts in English from author's summary, pub. in *Tree-Ring Bulletin,* Tucson, Ariz., 21 (1/4):21–24, April **1956.** 13 refs. **DWB**—Temperature during the vegetation period is the primary factor governing the tree ring width in northern Sweden. Density of the forest does not affect the climatic influences. The mathematical-statistical treatment of annual ring material is briefly outlined and the effect of cone yield and foliage is discussed. *Subject Headings:* **1. Dendrochronology 2. Climatic influences on tree ring widths 3. Sweden.**—*A.A.*

8.9–304 551.588.7:551.585.5

Fel'dman, IA. I. and Chubukov, L. A., **Klimat zasuchlivykh raĭonov SSSR i puti ego uluchsheniia.** [Climate of the dry regions of the USSR and methods for amelioration.] Moscow, Izd-vo Akademii Nauk SSSR, **1955.** 93 p. 30 figs., tables, refs. **DLC**—A popular account of the zonal characteristics of the climate of the dry regions of the U.S.S.R. and the changes which these climates are undergoing as a result of ameliorative measures. The individual chapters are as follows: the physical geographic conditions of the dry regions with a description of the soil and vegetation; discussion of the concepts of weather and climate and the application of Fedorov's method to the classification of climate into weather types with special reference to the dry regions; fundamental characteristics of the climates of the dry regions; climatic regimes of the winter, spring, summer and autumn seasons; and methods of ameliorating the climate of dry regions including an analysis of the macro- and micro-climatic effects of shelter belts, etc. Numerous photographs, graphs, maps and also statistical data are included. *Subject Headings:* **1. Climatic amelioration 2. Arid climates 3. U.S.S.R.**—*I.L.D.*

SYNOPTIC CLIMATOLOGY

8.9–305 551.589(211)

Synoptic meteorology of the polar regions (Meteorological Office discussion). *Meteorological Magazine,* London, 86(1019):130–138, May **1957.** 2 figs., 18 refs. **DWB**—Discussion opened by R. A. Hamilton and H. H. Lamb, Dec. 17, 1956. Hamilton described geographical characteristics and annual heat budget of north polar regions. Lamb dealt with Antarctic and compared Arctic and Antarctic, including upper winds. The discussion dealt especially with the question of katabatic winds in Greenland and the passage of depressions across the ice-sheet. *Subject Headings:* **1. Synoptic climatology 2. Polar regions. I. Hamilton, R. A. II. Lamb, H. H.**—*C.E.P.B.*

MISCELLANEOUS

COSMIC INFLUENCES

See also: **Solar eclipse effects** (Rastogni, Sethuraman), 8.9–328.

8.9–306 551.590.24:523.78(544)

A brief report on the observations recorded during the solar eclipse of 30 June 1954 at Phalodi in Rajasthan. *Indian Journal of Meteorology and Geophysics*, 7(3):215–224, July **1956.** 8 figs., 5 photos., table, 3 refs. **DWB**—Weather conditions, optical and instrumental observations, radio noise and ionospheric, magnetic, atmospheric electric potential gradient and conductivity observations made at India Phalodi (27°08′N, 72°22′E) by Kodaikanal, Poona (Met. Office), Alibag and New Delhi (Met. Office) personnel, are reported on in some detail, with excellent illustrations of eclipse, equipment and personnel. Although the weather was threatening for 2 days, clear sky prevailed in the region of the sun at the time of the eclipse. *Subject Headings:* **1. Eclipse expeditions 2. Solar eclipse, June, 1954 3. Phalodi, Rajashthan, India.**—*M.R.*

8.9–307 551.590.24:551.510.535

†Dominici, Piero, **Comportamento della ionosfera a Roma durante l'eclisse parziale di sole del 30 giugno 1954.** [Behavior of the ionosphere at Rome during the partial solar eclipse of June 30, 1954.] *Annali di Geofisica*, Rome, 9(1):107–131, Jan. **1956.** 3 figs., 3 tables, 62 refs., 5 eqs. English summary p. 128. **DLC**—From ionospheric data recorded at Rome during the solar eclipse of June 30, 1954, relations between the progress of an eclipse and variations of ionospheric phenomena (electron loss, recombination and attachment coefficients, sporadic E frequency) are derived. Eclipse effects appear in all ionospheric regions. It is called to attention that the ionizing sun does not correspond to the visible sun and therefore the use of solar physical (rather than optical) data is necessary. *Subject Headings:* **1. Eclipse effects on ionosphere 2. Solar eclipse, June 1954 3. Rome, Italy.**—*G.T.*

8.9–308 551.590.24:523.78(54)

*Jagannathan, P.; Chacko, O. and Venkiteshwaran, S. P. (*all Met. Office, Poona*), **Insolation measurements at Poona during the solar eclipse on Dec. 14, 1955.** *Indian Journal of Meteorology and Geophysics*, Delhi, 8(1):93–98, Jan. **1957.** 3 figs., table, 3 refs., 4 eqs. **DWB, DLC**—Measurements (shown in graphs and tables) of total solar and sky radiation, intensity of radiation in 4 spectral regions, air temperature at 4′, 15′ and 30′ and soil temperature at surface and 3″ depth made at the Central Agricultural Meteorology Observatory, Poona (18°32′N) during a partial (55%) solar eclipse, around noon on Dec. 14, 1955, show the magnitude of the reduction in radiant energy. The portion of the reduction due to the atmosphere is shown to be 13.7% (for this case), whereas a diminution of 35% occurred outside the atmosphere and 26% overall. Reduction of blue was greatest (45%). Soil temperature was reduced 11°F at the soil surface, and 6.1° at 3″ depth, air temperature fell only a few degrees with a 2 hour lag. *Subject Headings:* **1. Eclipse effects on solar radiation 2. Soil temperatures 3. Solar eclipse, Dec. 1955 4. Poona, India.**—*M.R.*

VISIBILITY

See also: **Visibility in clouds** (Zak, Marfenko), 8.9–254.

8.9–309 551.591.6:629.13(43)

Weiss, I., **Zeitliche Änderungen in der Häufigkeit des Auftretens von Flugwetter mit Erdsicht.** [Time changes in the frequency of flying weather with ground view.] *Meteorologische Rundschau*, 10(2):48–50, March/April **1957.** 3 tables, 2 refs. **DWB**—At most German airfields the "Visual Flight Rule" (visibility 3 mi, base of more than 5/10 cloud at least 1000 ft) has increased between pre-war and post-war periods. This is due to improved visibility, especially in the morning, and is attributed to war damage. The effect is decreasing with rebuilding. *Subject Headings:* **1. Visibility from airplanes 2. Vertical visibility 3. Germany.**—*C.E.P.B.*

OPTICAL PHENOMENA

See also: **Halos and ice crystals, Maudheim** (Liljequist), 8.9–21; **Turbidity factor** (Danč), 8.9–114; **Halo effects** (Sitnik), 8.9–192; **Refraction phenomena** (Tatarskiĭ), 8.9–204.

8.9–310 551.593.1

Teichert, F., **Untersuchungen zum Brechungsindex der Luft.** [Investigations of the index of refraction of air.] *Zeitschrift für Meteorologie*, 10(11):323–330, Nov. **1956.** 2 figs., tables, 5 refs., eqs. **DLC**—Refractive index of dry air was measured with an interferometer over 2 years at Wahnsdorf. Previous determinations of $(n_0-1)10^6$ ranged from 291.1 to 294.7: mean value found at Wahnsdorf 290.20 but this is not absolute. It sank from winter to spring and rose slowly from summer to winter. Greatest with S. winds, strong winds and changing pressure, and clear skies. Pt. II deals with technical details of measurement. *Subject Heading:* **1. Refractive index (optical).**—*C.E.P.B.*

8.9–311 551.593.12:061.3

†Iudalevich, F. F., **Soveshchanie po probleme mertsaniia zvezd.** [Conference on the problem of stellar scintillation.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz.*, No. 5:620–624, May **1956.** 38 refs. **DLC**—The summaries of papers read before the conference on stellar scientillation which was held in Oct. 1955 and which was organized by the Committee on Atmospheric Physics of the Physico-mathematical Section of the Academy of Sciences of the U.S.S.R. These included investigations of the scintillation of stars from the point of view of calculating and overcoming obstacles to the photoelectric recording of stellar spectra, astronomical visibility and stellar scintillation, scattering of radio waves in the case of a nonhomogeneous coefficient of refraction, statistical theory of the phenomenon of stellar scintillation, direct experimental investigations of temperature inhomogeneities in the atmosphere; fluctuations of atmospheric temperature on the basis of the wave showing the dependence of scintillation upon zenithal distance, etc. *Subject Headings:* **1. Scintillation 2. Conferences.** —*I.L.D.*

8.9–312 551.593.63

Schoch, Ernst, **Besondere Halo-Erscheinung am 20. September 1956 (beobachtet auf dem Grossen Inselsberg).** [Special halo phenomenon on Sept. 20, 1956, observed on Gross Inselsberg.] *Zeitschrift für Meteorologie*, 10(11):347–348, Nov. **1956.** fig. **DLC**—Halo of 22°, upper arc of contact, mock sun ring and 4 mock suns in cirrus; lasted from 9.30 to nearly 12.30. *Subject Heading:* **1. Halo observation.**—*C.E.P.B.*

8.9–313 551.593.63

Schubert, G., **Beobachtungen ausgeprägter Horizontalkreise im Jahre 1956.** [Observations of developed horizontal circles in 1956.] *Zeitschrift für Meteorologie*, 10(12):382–383, Dec. **1956.** 5 figs. **DLC**—At Schwerin, well developed mock sun rings were seen on April 12 (4 mock suns) and Sept. 19. On Sept. 19, 22° halo was colored above the sun; an upper arc of contact was slightly inclined to 22° halo and for a long time partly within it. Besides two lateral mock suns there was a brilliantly colored undersun. Phenomena continued from 8.45 to 20.50 (mock moons) and were visible over a wide area. *Subject Heading:* **1. Halo observation.**—*C.E.P.B.*

8.9–314 551.593.7:551.508.93

Cialdea, R., **Polarisation de la lumière du ciel diurne.** [Polarization of the sky light.] *I.U.G.G. Association of Meteorology, Rome, Sept. 1954, Scientific Proceedings.* London, Butterworth, **1956.** p. 540–542. 2 figs., 2 refs., eqs. **DWB**—After discussing briefly the relationship between diffused light and the polarized diurnal light of the sky, the author describes the considerations and the underlying principles of recording continuously the state of polarization of the light of the daylight sky. It consists of a photoelectric cell upon which a lens projects a certain region of the sky; between the lens and cell, a polaroid rotates continuously. The recorder measures the total diffused light and the polarized portion of light. The use of this recorder for analyzing nebulosity is described. *Subject Headings:* **1. Polarimetry 2. Polarization.**—*I.L.D.*

8.9–315 551.593.7:551.510.42

Dietze, Gerhard, **Grössenverteilung des atmosphärischen Aerosols und Himmelslicht-Polarisation.** [Size distribution of atmospheric aerosol and skylight polarization.] *Zeitschrift für Meteorologie*, 10(12):354–363, Dec. **1956.** 4 figs., 5 tables, 1 refs., 8 eqs. **DLC**—Size distribution of aerosol in free air according to JUNGE is $dN = Cr^{-2}\,dr$, where b averages 4. Five main types of distribution are plotted. Polarization of sky light is calculated for water droplet aerosol; its magnitude and spectral distribution are found to depend on size distribution. Comparison with measurements at Gotha confirms the power law of distribution as normal, and shows that unusual polarization is due to unusual size distribution. Coagulation of aerosol usually leads to a decrease of maximum polarization. *Subject Headings:* **1. Aerosol size distribution 2. Polarization.**—*C.E.P.B.*

ELECTRICAL PHENOMENA

See also: **IGY atmos. elec. program** (Israel), 8.9–40; **Thunderstorm elec. conf.** (Vul'fson, Levin), **8.9–52**; **Lightning strokes** (Wegener), 8.9–76.

8.9–316 551.594.11:551.515.4:634.94

Burr, H. S. (*Yale Univ. School of Medicine, New Haven, Conn.*), **Effect of a severe storm on electric properties of a tree and the earth.** *Science*, Wash., D. C., 124(3233):1204–1205, Dec. 14, **1956.** fig. **DLC**—Continuous records of the potential of a tree have been made for more than 10 yrs at Lyme, Conn. The potentials show diurnal, monthly, seasonal and sunspot period variations and in addition sharp characteristic changes during thunderstorms. One example of a record made during a severe squall on Sept. 14, 1956, is shown along with record of earth potential (N–S) for a 8-hr period prior to and following the storm. The tree and earth potentials showed a marked rise (+40 to 60 mv) and high level for 5 hrs before the squall and a sudden drop to below normal (−20–30 mv) during or just before the squall and an equally sharp recovery after the squall. Further experiments correlate air potentials and E-W potentials with tree and earth potentials. *Subject Headings:* **1. Severe storm effects on tree potential gradients 2. Thunderstorm effects on tree potential gradients 3. Geopotential during storms 4. Lyme, Conn.**—*M.R.*

8.9–317 551.594.14

Reiter, Reinhold, **Schwankungen der natürlichen Luftradioaktivität im Talniveau der nördlichen Kalkalpen.** [Variations of natural radioactivity of the air in valleys of the northern Chalcolithic Alps.] *Meteorologische Rundschau*, 10(2):44–45, March/April **1957.** fig., 5 refs. **DWB**—On rainless days in April–Nov. 1956, 420 measurements were made at Farchant, 5 km N of Garmisch in Loisach valley. Plotted against mean air flow over the Alps, points show a clear concentration between W. and S.E., and also extreme variations. Results are of interest for convection processes, health, etc. *Subject Headings:* **1. Radioactivity in the atmosphere 2. Bavarian Alps.**—*C.E.P.B.*

8.9–318 551.594.14:551.578.11

Teichert, F., **Die natürliche Radioaktivität des Regenwassers in Dresden-Wahnsdor, 1955/56.** [The natural radioactivity of rainwater in Dresden (Wahnsdorf) 1955/56.] *Zeitschrift für Meteorologie*, 11(1):14–19, Jan. **1957.** 7 figs., 6 refs. **DLC**—Rainfall collected within 10 min was treated with barium chloride solution and dilute sulfuric acid and filtrate inserted in an ionization chamber. Ion-pairs/sec were counted with an electrometer. Average was 101.7×10^4 pairs or 34.8×10^{-11} curies per liter, ranging from 69.7×10^4 during steady rain to 163.7×10^4 after a dry interval >24 hrs. It was greater in showers than in upglide rain or snow. *Subject Headings:* **1. Radioactivity of rainwater 2. Dresden, Germany.**—*C.E.P.B.*

8.9–319 551.594.21:551.576.11

Imianitov, I. M. and Chuvaev, A. P., **K voprosu ob usloviiakh perekhoda moshchnykh kuchevykh oblakov v grozovye.** [Problem of the conditions attending the transformation of large cumulus clouds into thunderstorm clouds.] *Meteorologiia i Gidrologiia*, Leningrad, No. 2:15–19, Feb. **1956.** 5 figs., 2 tables, ref. **DWB, DLC**—The author evaluates the results

of a study of the electrical properties of developing thunderstorm clouds during different stages of their life (from the moment of appearance to the falling of precipitation and the manifestation of thunder) and their comparison with the general properties of cumulus cloud development and with their microstructure. Data are given on the change in electrical field of large cumulus clouds during the artificial formation of ice crystals and photographs and radarscope diagrams of the various developmental states are presented. The electrical field in large cumulus clouds increases markedly when supercooled ice particles appear. The probability of transition to thunderstorm stage is determined by the relationship of the thickness of the supercooled and warm parts of the cloud. In purely aqueous clouds the growth of electrical field depends only to a slight degree upon their vertical thickness. *Subject Headings:* **1. Thunderstorm electricity 2. Cumulonimbus development.**—*I.L.D.*

8.9–320 551.594.223

Pflegel, Rudolf, **Beobachtung eines Kugelblitzes.** [Observation of ball lightning.] *Zeitschrift für Meteorologie*, 10(11):347, Nov. **1956. DLC**—Aug. 29, 1956, at Moritzburg, slow fall and explosion of ball lightning, diameter 15–20 cm, in a stable without damage. It was followed by an ordinary lightning stroke which destroyed lighting installation and set fire to the roof. *Subject Heading:* **1. Ball lightning.**—*C.E.P.B.*

8.9–321 551.594.25

†Reiter, Reinhold, **Das Verhalten luftelektrischer Grössen während Niederschlag in verschiedenen Hohenstufen, synoptisch betrachtet.** [Synoptic relations of atmospheric electric quantities during precipitation at different levels.] *Meteorologische Rundschau*, 10(2): 63–75, March/April **1957.** 15 figs., table, 51 refs. **DWB**—A 2-year study of atmospheric electricity is summarized, during the passage of fronts (with regard to the amount and type of precipitation at different levels), melting of free-falling precipitation, during showers, snow flurries, and under the influence of quiet thunderclouds, at 7 stations 675–2963 m (Zugspitze). The collector is described and typical examples of synoptic records reproduced and discussed. The numbers of cases with positive and negative current are tabulated. Influence of snow crystal structure and size on the external field is discussed. Bearing of results on origin of electricity of precipitation, especially in the melting zone, is considered. *Subject Heading:* **1. Electricity of precipitation.**—*C.E.P.B.*

8.9–322 551.594.25:551.311.1

Reynolds, S. E.; Brook, Marx and Gourley, Mary, **Thunderstorm electricity.** New Mexico Institute of Mining and Technology. Research and Development Div., Contract DA 3-99-07-022, Thunderstorm Report, No. 7, **1955**; Quarterly Report for period ending Feb. 7, 1955. 18 p. 4 figs., 4 refs. **DWB**—Following research on graupel electrification reported in Quarterly Report, No. 4 (May 7, 1954), the authors constructed apparatus to study electrification of two ice formations at different temperatures in frictional contact. Even at temperatures of −70°C the liquid water film existed at the contact. The amount of charge was the same as at −10° to −30°C. The effects of dissolved air can be explained on the basis of these experiments, but it is clearly demonstrated that dissolved air has little effect on the frictional electrification of ice. It was found that most of the contaminant ions (NaCl) are removed from the ice along with the air bubbles when the ice freezes, leaving a positive charged ice mass. *Subject Headings:* **1. Electrification of ice 2. Frictional electrification of ice 3. Thunderstorm electricity.**—*M.R.*

8.9–323 551.594.25:551.578.7

Reynolds, S. E.; Brook, Marx and Gourley, Mary, **Thunderstorm electricity.** New Mexico Institute of Mining and Technology. Research and Development Div., Contract DA 3-99-07-022, Thunderstorm Report, No. 8, 1955; Quarterly Report for period ending May 7, **1955.** 26 p. 5 figs., table, 8 refs. **DWB**—A device was designed to study electrification produced by ice friction such as occurs when graupel and snow crystals strike each other. Two rods (one stationary) are cooled to −15°C and then dipped into water at 0°C to produce a 1 mm ice coating on each. Pure distilled H_2O produced a negative charge on the warmer rod, whereas a contaminated solution also turned out to be negatively charged when frozen.

Apparatus was also devised for measuring contact potential difference and its use to determine contact potential of clean and contaminated (NcCl, $NHNO_3$ etc.) ice, changes in contact potential during slow heating and rapid temperature changes, relation between freezing potential and frictional electrification of ice etc. discussed and illustrated. *Subject Headings:* **1. Electrification of graupel 2. Thunderstorm electricity generation 3. Frictional electrification of ice.**—*M.R.*

AURORAS

8.9–324 551.594.5

Meinel, A. B. (*Yerkes Obs., Univ. of Chicago*), **The morphology of the aurora.** *National Academy of Sciences, Chicago, Proceedings*, 40(10):943–950, Oct. **1954.** 7 figs. **DWB**—This article discusses and illustrates the general nature of the aurora, the difficulty in photographing the phenomenon—especially in obtaining spectral photographs which often require several hours exposure, involving danger of mixed forms occurring—modern photographic or spectrographic equipment which allows isolated spectrophotographs of unmixed phases—hope that IGY will enable simultaneous spectrophotographs to be made at distant points. Latitude and hemispheric relations or variations, laboratory equipment which simulates changes in phase from that of the homogeneous arc (of extraterrestrial origin) to the rayed structure and sometimes pulsating draperies on patches, during which time the hydrogen (Ha) lines fade and high speed electrons accelerated to 50–200 ev and originating in the atmosphere take over. More can be learned. *Subject Headings:* **1. Auroral morphology 2. Auroral photography.** —*M.R.*

8.9–325 / 551.594.51:535.33:539.2

†Nicholls, R. W. (*Univ. of Western Ontario*), **Molecular band intensities and their interpretation.** (In: **The airglow and the aurorae: a symposium.** London, Pergamon, **1956.** p. 302–323. 5 figs., 17 tables, 58 refs., 25 eqs.) **DWB**—This is an account of some of the recent work of The Molecular Excitation Group, Dept. of Physics, Univ. of Western Ontario, on molecular transition probabilities and their use in the interpretation of spectra in terms of source conditions. Basic concepts which control band intensities are described; Franck-Condon factors are discussed; the r centroid concept and its applications are introduced. The interpretation of molecular band intensities in terms of relative transition probabilities, and variation of electronic transition moment with internuclear separation, are described together with illustrative results for a number of band systems. A method by which eye estimates of band intensities may be treated is briefly outlined. *Subject Heading:* **1. Molecular band spectra.** —*From author's introduction.*

8.9–326 551.594.51:535.33

Omholt, A. (*Auroral Obs., Tromso, Norway*), **Intensity measurements of the green auroral oxygen line and the negative nitrogen bands emitted from rapidly varying aurorae.** (In: **The airglow and the aurorae: a symposium.** London, Pergamon, **1956.** p. 178–182. 3 figs., 8 refs., 3 eqs.) **DWB**—Photoelectric measurements have been made of the intensities of the forbidden oxygen line 5577 Å and the negative nitrogen band 4278 Å emitted from aurorae which give rapid intensity variations within a fixed volume of the upper atmosphere (moving of pulsating forms). The lifetimes of the oxygen atoms in the metastable ^1S state in the aurorae have been calculated, assuming the excitation rates of the two emissions to be proportional, and the observed time delays between the two emissions to be due to this lifetime. The records are consistent with these assumptions, and give lifetimes of the metastable OI ^1S state during these aurorae of the order 0.45 to 0.75 sec. *Subject Heading:* **1. Auroral spectral intensity.**—*Author's abstract.*

RADIO METEOROLOGY

See also: **Ionospheric radio wave polarization** (Bain, Glass), 8.9–158; bibliography on **Tropospheric Propagation, p. 1243–1273.**

8.9–327 551.594.6

Helliwell, R. A.; Crary, J. H.; Smith, R. L.; (*all, Radio Prop. Lab., Stanford Univ., Stanford, Calif.*), and Pope, J. H. (*Geophysical Inst., Univ. of Alaska, College, Alaska*), **The**

"nose" whistler—a new high-latitude phenomenon. *Journal of Geophysical Research*, Wash., D. C., 61(1):139–142, March **1956.** fig., 4 refs., 2 eqs. **DLC**—A peculiar type of whistler recorded at College, Alaska on July 10, 1955 (65°lat) not detectable by ear is illustrated and the origin speculated on. A general form of Eckersley's dispersion law gives a predicted form of impulse similar to the observed nose whistlers. The usual whistlers are thought to be the descending portion of nose whistlers. They may give information on conditions in the ring current region and explain the dawn chorus. *Subject Headings:* **1. Nose whistlers 2. Whistlers 3. Sferics 4. College, Alaska.**—*M.R.*

8.9–328 551.594.7:551.590.24

Rastogi, R. G. and Sethuraman, (*both, Physical Res. Lab., Ahmedabad*), **Field strength measurements of radio waves during the partial solar eclipse of 14 December 1955 at Ahmedabad.** *Journal of Scientific and Industrial Research, Sec. A*, New Delhi, 15(7):303–305, July **1956.** 2 figs., 3 tables, 2 refs. **DWB, DLC**—The results of field strength measurements made at Ahmedabad during the partial solar eclipse of the 14 Dec. 1955 on radio transmissions from Bombay on 7.24 and 9.44 Mc/s. are described. The 7.24 Mc/s. waves are reflected from the E layer, while the 9.55 Mc/s. waves penetrate E and are reflected from the F_2 layer on normal days. During the eclipse, the field strength of the 7.24 Mc/s. transmission decreased below the value for normal days, while the 9.55 Mc/s. waves showed increased field strength. The changes are explained in terms of the vertical incidence frequencies of the waves and the critical frequencies of the ionospheric layers at Ahmedabad. *Subject Headings:* **1. Radio wave propagation 2. Solar eclipse effects.**—*Authors' abstract.*

ACOUSTICAL PHENOMENA

8.9–329 551.596.1

Ertel, Hans, **Ein Problem der meteorologischen Akustik: Die tagesperiodische Variation der Schallintensität.** [Problem in meteorological acoustics: the daily variation of sound intensity.] *Akademie der Wissenschaften, Berlin. Klasse für Mathematik, Physik und Technik, Sitzungsberichte*, No. 2, **1955.** 17 p. 14 refs., 30 eqs. **DLC**—Humboldt's quantitative explanation of the daily periodic variation of sound intensity is discussed and a quantitative, theoretical treatment of this phenomenon is presented. It is shown that the thermal convective variation of atmospheric temperature causes a daily periodic damping of sound amplitude. Accordingly the extinction coefficient of sound intensity is directly proportional to the thermal-convective temperature variations which show a maximum by day and a minimum by night. *Subject Headings:* **1. Diurnal sound intensity variations 2. Acoustical phenomena.**—*I.L.D.*

PART II. ANNOTATED BIBLIOGRAPHY ON PROPAGATION OF UHF, VHF, AND SHF RADIO WAVES THROUGH THE TROPOSPHERE (–1952)

By: *Wilhelm Nupen*

INTRODUCTION

The literature on the meteorological and topographical factors affecting the propagation of high frequency radio or radar waves (300 to 30,000 Mc) has become so voluminous and the sources are so scattered throughout the publications of a score of countries that it is periodically necessary to collect and organize the reference material in order to facilitate its location and accurate citation. Several good bibliographies have thus far been prepared and published in one form or another (*see items* 8I–4, 71, 107, 116, and 139).

With the aid of material assistance from the National Bureau of Standards Boulder Laboratories, and particularly from Mr. B. R. Bean of the Tropospheric Analysis Section, Radio Propagation Engineering Division, Central Radio Propagation Laboratory of the Bureau of Standards at Boulder, Colo., we have compiled a rough listing of over 600 references to pertinent material on various aspects of tropospheric propagation, supplemented by several hundred more references sent to us from radio propagation laboratories in several countries. From these references we have selected a representative sample of the best material, which together with the references contained in those bibliographies already published, and in the bibliographies on **Inversions** (*MAB*, Vol. 7, No. 6, June 1956) and those on **Radio Meteorology** (Vol. 2, No. 8, Aug. 1951, Vol. 6, No. 7, July 1955) and on **Ionospheric Propagation** (Vol. 6, No. 4, April 1955), will give the investigator a fairly complete coverage of all of the recent literature on Tropospheric, Ionospheric and Radar Meteorology.

Specifically, this bibliography is concerned with anomalous radio propagation in the UHF, VHF and SHF ranges, with radio refractive index and its measurement, with refractometers, and with the climatology and meteorology of the various refractive index parameters from the micrometeorological layer up to the tropopause. Works on ionospheric propagation by vertical or pulse transmitters; on radio or radar meteorology when it is concerned with storm detection, cloud physics, or attenuation of microwaves by rain, clouds, fog, storms or reflecting layers; works dealing with reflections from auroras, meteors, etc.; with micrometeorological observations not comprising specific refractive index values; with optical frequency refractive index studies not directly applicable to radio frequency propagation, nor with non-meteorological propagation studies have been omitted.

In a few cases reference is made in the outline to subjects which will not be exhaustively, nor even selectively, covered by the present bibliography. The remainder of the subjects in the outline give a fair idea of the range of subject matter covered in this, and to be covered in the next, bibliography. Because of the large number of items selected for publication, the bibliography was divided into two parts, the first to cover the period up to and including 1952; the second to cover the material published in 1953–1957, inclusive. A few classical articles have been included in order to give a rough historical perspective, but no attempt has been made to trace the threads of research and discovery back to Maxwell, Hertz, Lord Rayleigh, or Mie in the pioneer period from 1871 to 1908, since the theory of tropospheric scattering was not refined for use in beyond-the-horizon calculations until after World War II.

If any important articles are inadvertently omitted we would be pleased to have them called to our attention. Material thus coming to our attention will be found in the appropriate sections of future monthly issues of *MAB*.

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1927

8I–1 551.510.535:551.594.7(02)

†Pedersen, Peder Oluf, **Propagation of radio waves along the surface of the earth and in the atmosphere.** *Ingeniörvidenskabelige Skrifter, Ser. A, 15a, Copenhagen* (issued by Danmarks Naturvidenskabelige Samfund udgivet ved Udvalget for Ingeniörvidenskabelig Forskning), **1927.** 244 p. numerous figs., 11 tables, foot-refs., eqs. Also: **Appendix,** *Ibid.*, 15 b, **1927.** 19 p. figs. **DLC**—This is a pioneer text covering all the known theory and empirical knowledge of radio propagation in the troposphere and ionosphere. The physical and chemical properties of the atmosphere are discussed and illustrated with models and diagrams. Optical as well as electrical properties are considered. Effects of solar radiation and corpuscular emissions and ionization of rarified gasses, effects of wind, pressure, mean free path, number of collisions, lifetime of free electrons, recombination, cosmic rays, auroras, discontinuities, sunrise and sunset, wave length, magnetic fields, etc., are discussed. (*Same item as* 6D–9, April 1955, *MAB.*) *Subject Headings:* **1. Ionospheric propagation 2. Tropospheric propagation 3. Textbooks.**—*M.R.*

1929

8I–2 551.594.7:551.509

Colwell, R. C., **Fading curves and weather conditions.** *Institute of Radio Engineers, N. Y., Proceedings,* 17(1):143–148, Jan. **1929.** 11 figs. **DLC**—Brief report on observations at Morgantown with a Shaw recorder, of station KDKA April–May 1927. The sunset fading curves on fine days were more irregular than those on cloudy days. The signal strength was stronger in daylight hours. A falling curve indicated clearing weather and a rising curve cloudy weather or rain next day. *Subject Headings:* **1. Propagation experiments 2. Weather forecasting.**—*W.N.*

8I–3 551.594.7

Fuchs, J., **Die Sende- und Empfangsverhältnisse im Hochgebirge mit besonderer Berücksichtigung der atmosphärischen Störungen.** [Transmission and reception conditions in the high mountains, with special reference to atmospheric disturbances.] *Hoch-frequenztechnik und Electroakustik,* Berlin, 34(3):96–101, **1929.** 5 figs. **DLC**—Observations of weather conditions made at Sonnblick Observatory (3106 m) near Salzburg, Austria, are correlated with sending and receiving conditions. Disturbances due to precipitation in the vicinity (drizzle, light, moderate and heavy

rain, graupel, light and heavy snowfall) are classified according to the type or tone of noise heard in the receiver. Conditions in the mountains are similar to those on the plains but, according to the author, the mountains are most suitable for research into sources of atmospheric disturbances. (*Same item as* 2K–97, Nov. 1951, *MAB.*) *Subject Headings:* **1. Mountain meteorology 2. Sferics 3. Radio transmission 4. Sonnblick, Austria.**

1931

8I–4 551.594.7:016

†Parkinson, T.; Kirby, S. S.; Arnold, P. N. et al., **Bibliography on radio wave phenomena and measurement of radio field intensity.** *Institute of Radio Engineers, Proceedings,* 19(6):1034–1084, June **1931. DLC**—The bibliography contains 630 annotated entries classified under subject and related subdivisions in chronological order: radiation, radio wave phenomena, fading, daily and seasonal variations, direction variations; meteorological, geophysical and cosmic effects; eclipses, reflection, refraction, diffraction, absorption, polarization, K-H layer, wave front angle, transmission formulas, atmospheric disturbances, strays, directional properties, etc. (*Same item as* 4K–86, Nov. 1953, *MAB.*) *Subject Heading:* **1. Radio wave propagation bibliographies.**—*W.N.*

1932

8I–5 551.594.7

Marconi, Guglielmo, **Radio communication by means of very short electrical waves.** *Royal Institution of Great Britain, Proceedings,* 27(130):509–544, Dec. **1932.** 10 figs., ref. **DLC**—Author describes construction and features of improved transmitters and receivers, methods used and results achieved, such as "beyond horizon" communication at 600,000 kc. This lecture, given before the Royal Institution Dec. 2, 1932, was accompanied by schematic diagrams and photographs which are reproduced here. *Subject Headings:* **1. Radio communication 2. Propagation experiments 3. Radio instruments.**—*W.N.*

1933

8I–6 551.594.7:621.396.11

Schelleng, J. C.; Burrows, C. R. and Ferrell, E. B., **Ultra short wave propagation.** *Institute of Radio Engineers, N. Y., Proceedings,* 21(3):427–463, March **1933.** 18 figs., 2 tables, numerous refs., 15 eqs. **DLC**—Pt. I contains some results of an experimental study of USW propagation in order to obtain quantitative data for the theoretical work in Pt. II where author analyzes experimental results in comparison with current theory. Such topics as reflection, diffraction and refraction are treated in relation to optical and nonoptical sea and land paths. Some characteristics of frequencies as a function of topography are considered. *Subject Headings:* **1. UHF propagation experiments 2. Topographic influences.**—*W.N.*

1935

8I–7 551.594.7:621.396

*Burrows, Charles R.; Decino, Alfred and Hund, Loyd E., **Ultra-short-wave propagation over land.** *Institute of Radio Engineers, N. Y., Proceedings,* 23(12):1507–1535, Dec. **1935.** 21 figs., 11 tables, numerous refs., 25 eqs. **DLC**—Frequency characteristics at 100–200 Mc are discussed. Experimental confirmation both for an optical and nonoptical path involved in the approximate theory given, was established, and discrepancies between theoretical and practical results indicate absence in the formula of some element important to this propagation. *Subject Headings:* **1. Microwave propagation theories 2. Topographic influences.**—*W.N.*

1937

8I–8 551.594.7:621.396:551.515.4(268)

Arkhangel'skiĭ, B. F., **Rasprostranenie adiovoln v severnykh shirotakh.** [Propagation of radio waves in northern latitudes.] *Leningrad. Arkticheskii Nauchno-Issledovatel'skii Institut, Trudy,* 78:17–20, **1937.** 5 figs., English summary p. 20. **DLC**—Report on observations made in 1932/33 on Franz-Josef Land, measuring the intensity of radio waves in the diapasone 20–2000 m, transmitted from stations with a distance from 2500 to 10,000 km. The influence of ultraviolet and corpuscular solar radiation during the polar day and night is discussed. The relation of sferics to the main regions of thunderstorm activity, presented on a map, is shown. (*Same item as* 5I–61, Sept. 1954, *MAB.*) *Subject Headings:* **1. Radio wave propagation 2. Sferics 3. Thunderstorm activity 4. Franz-Josef Land.**—*A.A.*

8I–9 551.510.52:551.594.7

Friend, A. W. and Colwell, R. C., **Measuring the reflection regions in the troposphere.** *Institute of Radio Engineers, N. Y., Proceedings,* 25(12):1531–1541, Dec. **1937.** 10 figs., 7 refs. **DLC**—

The modified radio equipment at frequencies of 1614, 2398 and 3492.5 kc is graphically outlined. The equipment permitted determination of several stratified layers at 1–12 km altitude. It is suggested that the reduced velocities of waves, (as much as 50–85% that of the velocity in vacuum) observed over a 15 mi distance, are controlled by the reflecting lower atmosphere. *Subject Headings:* **1. Tropospheric layers 2. Propagation experiments.**—*W.N.*

1938

8I–10 551.510.52:551.594.7:551.509

Colwell, R. C. and Friend, A. W., **Studies of tropospheric changes and radio reception.** *American Meteorological Society, Bulletin*, 19(7):317–319, Sept. **1938.** fig., 9 refs. **DLC**—Forecasting weather conditions one day ahead was done with 80% accuracy using the KDKA station signals, intensity of which was found to depend upon tropospheric layers (also designated as the C-region). Inversion conditions generally affect radio wave propagation and a cold front was always linked to lower tropospheric reflectivity. The observations were made at W. Virginia Univ., Morgantown about 100 km south of the KDKA radio station in Pittsburgh, Penna. *Subject Headings:* **1. Tropospheric change effects on radio reception 2. Weather forecasting.**—*W.N.*

8I–11 551.594.7

Englund, Carl Robert; Crawford, A. B. and Mumford, W. W., **Ultra-short-wave radio transmission through the non-homogeneous troposphere.** *American Meteorological Society, Bulletin*, 19(8):356–360, Oct. **1938.** 4 figs., 4 refs., eq. **DLC**—This is the first experimental proof of boundaries and layers as controlling tropospheric radio wave propagation, multiple paths of which is a function of discontinuities. The observations were conducted in the fall of 1933 from a simple surface station at Sea Bright, N. J., and over a 15 to 120 mi path to an air-craft at 1000–8000 ft altitude using 4.6 m and 1.58 m wavelengths. Experimental approach, results obtained and conclusions are given briefly. *Subject Headings:* **1. UHF radio propagation 2. Discontinuities.**—*W.N.*

8I–12 551.594.7:621.396.11

Englund, C. R.; Crawford, A. B. and Mumford, W. W. **Ultra-short-wave transmission and atmospheric irregularities.** *Bell System Technical Journal*, 17(4):489–519, Oct. **1938.** 19 figs., tables, 13 refs. **DLC**—Mechanism of fading of 1.6 to 5.0 meter waves over a 70-mi ocean path was studied 106 days over a 2-year period. Both horizontal and vertical polarization were used; when on different wavelengths, the shorter wave faded more. Presence of multiple signal components along the earth's surface are calculable (cf. Wwedensky, Van der Pol and Gray); those, and one or more air-mass-reflected components may encompass the explanation for fading mechanism. Amplitude changes up to 40 db and fading rates up to 5 fades per minute were observed. Reflecting boundaries from 5.5 km down to 1.9 km were measured and lower ones are indicated. *Subject Headings:* **1. Ultra-short wave transmission 2. Radio fading.**—*W.N.*

1939

8I–13 551.594.7:551.510.52

Friend, A. W. and Colwell, R. C., **The heights of the reflecting regions in the troposphere.** *Institute of Radio Engineers, N. Y., Proceedings*, 27(10):626–634, Oct. **1939.** 10 figs., 10 tables, 16 refs. **DLC**—This discussion is on the so called C-regions, a tropospheric layer at about 1.8 km but characterized by variation of altitude with change in weather, influenced perhaps by solar activity. The discovery of this region was made in the summer of 1938. The tropospheric reflection occurs generally below 2.0 km as a function of discontinuities, the reflection coefficient being about 10^{-3} to 10^{-6}. *Subject Headings:* **1. Tropospheric reflection 2. Reflecting layer height.**—*W.N.*

1940

8I–14 551.594.7:551.510.52:621.396

Colwell, R. C., **The troposphere and radio waves.** *Institute of Radio Engineers, N. Y., Proceedings*, 28(6):299–302, June **1940.** fig., table, 8 refs., 3 eqs. **DLC**—The influence of weather on long and short waves is theoretically explained by changing cyclones and anticyclones that vary the height and the reflecting power of the inversion discontinuities. *Subject Headings:* **1. Microwave propagation 2. Inversions 3. Radio meteorology.**—*W.N.*

8I–15 551.594.7:551.574.1

Franz, K., **Die Schwächung sehr kurzer elektrischer Wellen beim Durchgang durch Wolken und Nebel.** [Attenuation of very short electric waves during passage through clouds and fog.] *Hochfrequenz-Technik und Elektroakustik*, 55(5):141–143, May **1940.** 4 figs., table, 10 refs., eqs. **DLC**—This theoretical discussion shows that attenuation is controlled by drops of liquid water and not by water vapor. The degree of attenuation depends on amount of liquid water rather

than drop size distribution. It is demonstrated that the attenuation is less in water distributed among drops than it would be had the same amount of water been in a concentrated layer. *Subject Headings:* **1. Atmospheric attenuation of VHF waves 2. Water drop effects.**—*W.N.*

1941

8I–16 551.594.7

Norton, K. A., **The calculation of ground-wave field intensity over a finitely conducting spherical earth.** *Institute of Radio Engineers, N. Y., Proceedings,* 29(12):623–639, Dec. **1941.** 16 figs., 10 tables, numerous refs., 60 eqs. **DLC**—Earlier and present theoretical knowledge is here summarized into graphical methods along with equations so as to facilitate the work of calculation under discussion. *Subject Heading:* **1. Ground wave field intensity calculation.**—*W.N.*

8I–17 551.594.7:621.396.11

Selvidge, H., **Diffraction measurements at ultra-high frequencies.** *Institute of Radio Engineers, N. Y., Proceedings,* 29(1):10–16, Jan. **1941.** 12 figs., 7 refs., eq. **DLC**—A successful attempt to measure the diffraction alone was conducted over the natural knife edge of Mount Cadillac (1532 f.a.s.) of Mount Desert Island on the Atlantic coast near Harbor, Maine. The results of the tests at 55 and 110 Mc are presented in curves showing good agreement with theory. Horizontally polarized waves were diffracted more than the vertical. *Subject Headings:* **1. UHF radio propagation 2. Diffraction measurement.**—*W.N.*

1944

8I–18 551.594.7:621.396.9

Treloar, H. M., **Meteorological factors in four situations in which abnormal radar propagation occurred off Cape Moreton.** *Australia. Meteorological Services, Research Report, Ser. 10,* No. 19, **1944.** 7 p. 15 maps. **DWB**—Four occasions of outstanding radar abnormalities are broken down into sectional meteorological situations significant for radar propagation. Meteorological situation is specified, and the possible radar effect tentatively stated. Synoptic charts of eastern Australia are appended. (*Same item as* 4D–137, April 1953, *MAB.*) *Subject Headings:* **1. Radar meteorology 2. Radar propagation 3. Cape Moreton, Queensland.**—*H. P. Kramer.*

8I–19 551.594.7:621.396.9

Treloar, H. M., **Radar meteorological report—probable radar ducts in September in region including north Australia and islands to the north and some general matters.** *Australia. Meteorological Services, Research Report, Ser. 10,* No. 20, **1944.** 21 p. 5 fold. charts, tables. **DWB**—Author considers the classes, distribution and intensity of warm, dry winds moving out over the sea and the heights of the resultant radar ducts. He states that in such air streams combined rapid vertical fall of humidity and some vertical increase of temperature make long range reception possible. His research is theoretical, and results tentative, but of use to practical researchers in this region. (*Same item as* 4D–138, April 1953, *MAB.*) *Subject Headings:* **1. Radar meteorology 2. Radar propagation 3. Northern Australia.**—*H. P. Kramer.*

8I–20 551.5:621.396.9

U. S. Weather Bureau, **Tropospheric weather factors likely to affect superrefraction of UHF-SHF radio propagation as applied to the tropical western Pacific.** *U. S. Weather Bureau, Report* R.P.-1, **1944.** 100 p. 53 figs. **DWB**—Meteorological characteristics of the tropical western Pacific, including the East Indies, are presented in this preliminary report as a guide to the radar-meteorologist engaged in forecasting the atmospherically modified index of refraction, *M* curve. Meteorological characteristics of the area are discussed first, followed by general discussion of various types of normal inversions in the atmosphere and their associated modified refractive index. The meteorological factors which disrupt normal inversions are taken up. Finally, basic relations between weather factors and modified index curves noted. Methods of computing the *M* curve from aerological low-level sounding data are presented. In general, theoretical aspects of the whole problem are not investigated. Numerous meteorological charts and diagrams are included. (*Same item as* 5B–222, Feb. 1954, *MAB.*) *Subject Headings:* **1. Radar meteorology 2. Radio wave propagation 3. Superrefraction 4. Southwest Pacific.**

1946

8I–21 621.396

Bergmann, Peter G., **Propagation of radiation in a medium with random inhomogeneities.** *Physical Reviews,* 70(7–8):486–492, Oct. **1946.** 4 figs., 63 eqs. **DLC**—It is shown how approximate formulas, derived from geometrical optics, correlate statistical properties of inhomogeneities with fluctuations in signal level, and how a simplification of the formulas permits prediction of signal

fluctuations dependent on range. *Subject Headings:* **1. Radio communication range 2. Field strength fluctuations.**—*W.N.*

8I–22 551.524.4 551.571.4

*Craig, Richard A., **Measurements of temperature and humidity in the lowest 1000 feet of the atmosphere over Massachusetts Bay.** *Papers in Physical Oceanography and Meteorology*, Cambridge, Mass., 10(1), Nov. **1946.** 47 p. 54 figs., 11 refs. **DWB**—There is a wealth of information in this exemplary presentation of temperature and humidity profiles. Of 500 aircraft soundings made over Massachusetts Bay in the summer and fall of 1944, 51 were selected which represent a wide variety of conditions for radio wave propagation. Profiles of temperature, dew point, and associated refractive index, based on psychrometric measurements at 50, 100, 150, 200, 300 . . . and 1000 ft above the water surface, are shown for each of the 51 ascents, along with an analysis of the curves and a detailed summary of the synoptic situation. In the majority of cases, the curves exhibit temperature inversions and marked changes in the dew point lapse rate due to air mass modification by passage over cool water, to subsidence, or to the presence of cold or warm fronts. No summary of the climatological picture is attempted, but this can be had by careful examination, and comparison of the individual profiles. (*Same item as* 7F–84, June 1956, *MAB.*) *Subject Headings:* **1. Temperature profiles 2. Humidity profiles 3. Airplane observations (Apob data) 4. Radio wave propagation 5. Massachusetts Bay, Mass.**—*R. S. Quiroz.*

8I–23 551.594.7

Crawford, A. B. and Sharpless, W. M., **Further observations of the angle of arrival of microwaves.** *Institute of Radio Engineers, N. Y. Proceedings*, 34(11):845–848, Nov. **1946.** 3 figs., 5 refs. **DLC**—Observations in the summer of 1945 with a specially built antenna with about 2½ sharper beam operating at 1.25 cm are discussed here. Small abrupt changes in the refractive index such as may be present at the boundaries of inversion layers may be responsible for high-angle components, rather than superrefraction in inversion layers. The multiple-path transmission may be closer to its clarification if simultaneous measurements were made of angle-of-arrival in-line paths of different lengths. *Subject Headings:* **1. Propagation experiments 2. Angle-of-arrival 3. Radio instruments.** —*W.N.*

1947

8I–24 551.524.4:551.571.4:551.594.7

Appleton, Sir Edward Victor, **The influence of tropospheric conditions on ultra-shortwave propagation.** (In: Physical Society of London and Royal Meteorological Society, **Meteorological factors in radiowave propagation; report of conference held 8 April, 1946 at the Royal Institution, London.** London, [1947] p. 1–17. 11 figs., 22 eqs.) **DWB**—It is possible for a radio ray, starting out horizontally, to follow the curvature of the earth if the vertical gradient of refractive index is equal to -0.15×10^{-6}/m. This condition may exist where the temperature increases with height as rapidly as 1°C per 9–10 m, or the vapor pressure falls by 1 mb in 30 m, but the most favorable situation prevails when a strong temperature inversion and a rapid lapse of water vapor occur together. The author cites advection, radiative cooling over land, and subsidence as processes leading to the establishment of temperature inversions of sufficient magnitude to result in the superrefraction of radio waves. (*Same item as* 7F–89, July 1956, *MAB.*) *Subject Headings:* **1. Inversion effects on radio wave propagation 2. Superrefraction.**—*R. S. Quiroz.*

8I–25 551.594.7:621.396.812

Bullington, Kenneth, **Radio propagation at frequencies above 30 megacycles.** *Institute of Radio Engineers, Proceedings*, 35(10):1122–1136, Oct. **1947.** 14 figs., 2 tables, 10 refs., 20 eqs. **DLC**—The results of this detailed study on factors influencing radio propagation (frequency, distance antenna heights, earth's curvature, atmospheric conditions, ground obstacles) are presented in a series of nomograms that quickly give an estimate of the received power and received field intensity for a given point-to-point transmission path. Comparison between empirical methods to estimate a.o., the effect of atmospheric refraction and other factors, with experimental data on shadow losses and fading ranges, is presented. *Subject Headings:* **1. Microwave propagation 2. Atmospheric influence 3. Nomograms.**—*From author's abstract.*

8I–26 551.515.4:551.501.81

Coons, Richard D., **Guided propagation of radar in thunderstorm conditions.** *American Meteorological Society, Bulletin*, 28:324–329, Sept. **1947.** 8 figs., 3 refs. **DLC**—Explanation given of guided propagation, or trapping, of radar beams. Example cited when stable conditions favorable to the formation of a trapping duct existed after the passage of a thunderstorm. (*Same item as* H–164, Aug. 1950, *MAB.*) *Subject Headings:* **1. Thunderstorms 2. Radar storm detection.**

8I–27 551.524.4:551.594.7

*Durst, C. S., **Radio climatology.** (In: Physical Society of London and Royal Meteorological Society, **Meteorological factors in radio-wave propagation; report of conference held 8 April 1946 at the Royal Institution, London.** London [1947]. p. 193–212. 9 tables, 8 figs. (incl. 6 maps), 8 refs.) **DWB**—After outlining the meteorological conditions favorable for abnormal propagation of radio waves, the author proceeds to sketch a radio climatology of the world. The first step is a comparison of actual radar performance with local meteorological conditions in the Persian Gulf, Arabian Sea, Bay of Bengal, and Australia, as reported by H. G. Booker in a series of British reports, c. 1943. For each area data on radar performance, air-sea temperature differences, and sign and magnitude of vertical motion, are presented, usually by months. The second phase involves world-wide mapping of humidity mixing ratio and of areas with subsidence, areas with air temperature greater than sea surface temperature, and areas with sea temperature greater than air temperature. Such maps are presented for the month of July, and from these conclusions are reached regarding the potential for superrefraction in areas throughout the world. (*Same item as* 7F–90, June 1956, *MAB.*) *Subject Headings:* **1. Radio climatology 2. Superrefraction 3. Climatic charts.**—*R.S.Q.*

8I–28 551.594.7

*Katzin, Martin; Bauchman, Robert and Binnian, William, **3- and 9-centimeter propagation in low ocean ducts.** *Institute of Radio Engineers, Proceedings,* 35(9):891–906, Sept., **1947.** 27 figs., 5 tables, 3 refs., eqs. **DLC**—Results of sea and shore measurements with one radio and radar along with simultaneous meteorological observations are discussed. The tests were conducted in the trade-wind area, off the east coast of Antigua, Brit. West Indies. Usabilities of several cm wavelengths under various meteorological conditions are considered. *Subject Headings:* **1. Propagation experiments 2. Directed radio transmission 3. Radio-weather conditions 4. Antigua, Brit. West Indies.**—*W.N.*

8I–29 551.594.7:551.510.52:06(71)

Miller, G. A.; Halbert, H. W.; Doherty, L. H. and Swanson, D. A., **Final report Suffield Tropospheric Project.** Canadian Radio Wave Propagation Committee, Feb. 20, **1947.** 39 sheets, numerous figs., numerous graphs, 10 refs. **MH-BH**—This is the third of three reports and gives the (final) results of the tropospheric propagation experiments carried out at Suffield, Alberta from June 1, 1945 through April 1, 1946. Some results obtained from radar observations or echoes (spaced corner reflectors) are given. *Subject Headings:* **1. Microwave propagation 2. Propagation experiments 3. Suffield, Alberta.**—*W.N.*

8I–30 621.396.6

Norton, K. A. and Omberg, A., **The maximum range of a radar set.** *Institute of Radio Engineers, N. Y., Proceedings,* 35(1):4–24, Jan. **1947.** 11 figs., 2 tables, 36 refs., 70 eqs. **DLC**—Formulas to calculate the maximum range of a radar set are demonstrated here along with several of the factors analyzed on which a given radar set depends for maximum range. In addition to electronics, etc., the meteorological elements involved in radio wave propagation are discussed. *Subject Headings:* **1. Propagation experiments 2. Radio instruments 3. Radio communication range.**—*W.N.*

8I–31 551.594.7:621.396

Physical Society of London and Royal Meteorological Society, **Meteorological factors in radio-wave propagation; report of a Conference held on April 8, 1946 at the Royal Institution, London.** London [**1947?**]. 325 p. figs., tables, refs. **GB-MO**—Review by H. Koschmieder in *Zeitschrift für Flugwissenschaften,* Brunswick, 2(6):156, June **1954.** **DLC**—This report includes 21 papers describing various investigations concerned with the effect of the meteorological conditions of the lower atmosphere on the bending of very short radio waves transmitted through it. The list of contributions is as follows: Appleton, Sir Edward, **The influence of tropospheric conditions on ultra-short wave propagation,** p. 1–17. Smith-Rose, R. L. and Stickland, M. C., **An experimental study of the effect of meteorological conditions upon the propagation of centimetric radio waves,** p. 18–37. Sheppard, P. A., **The structure and refractive index of the lower atmosphere,** p. 37–79. Booker, H. G. and Walkinshaw, W., **The mode theory of tropospheric refraction and its relation to wave-guides and diffraction,** p. 80–127. Hartree, D. R., Michel, J. G. L. and Nicolson, Phyllis, **Practical methods for the solution of the equations of tropospheric refraction,** p. 127–168. Ryde, J. W., **The attenuation and radar echoes produced at centimeter wave-lengths by various meteorological phenomena,** p. 169–189. Westwater, F. L., **Radar storm detection I,** p. 190. Ross, R. G., **Radar storm detection II,** p. 190–193. Durst, C. S., **Radio climatology,** p. 193–212. Johnson, Sir Nelson K., **Meteorological investigations in connection with radio propagation,** p. 212–215. Saxton, J. A., **The dielectric properties of water vapour at very high radio frequencies,**

p. 215–238. RAMSAY, J. A., **The vertical distribution of radar field strength over the sea under various conditions of atmospheric refraction,** p. 238–242. ALEXANDER, F. E. S., **Observations of unorthodox radar vision in the vicinity of New Zealand and Norfolk Island,** p. 242–249. MACFARLANE, G. G., **A method for deducing the refractive-index profile of a stratified atmosphere from radio observations,** p. 250–252. STICKLAND, A. C., **Refraction in the lower atmosphere and its application to the propagation of radio waves,** p. 253–267. BEST, A. C., **A standard radio atmosphere for microwave propagation,** p. 267–273. BULL, G. A., **Note on errors in measurement of the refractive index of the air for high-frequency radio waves consequent upon errors in meteorological measurements,** p. 273–278. SAXTON, J. A. and LANE, J. A., **The anomalous dispersion of water at very high radio frequencies.** Pts. I–IV, p. 278–325. (*Same item as* 5J–124, Oct. 1954, *MAB.*) *Subject Headings:* **1. Refraction of electromagnetic waves 2. Conferences.**

8I–32 551.594.7

Pickard, Greenleaf W. and Stetson, Harlan T., **Tropospheric reception at 42.8 mc and meteorological conditions.** *Institute of Radio Engineers, N. Y., Proceedings,* 35(12):1445–1450, Dec. **1947.** 16 figs. **DLC**—Data of the alpine FM Station W2XMN transmissions over the 167-mile path to Needham, Mass., are analyzed and presented in diagrams. This purely tropospheric propagation as influenced by meteorological elements showed a distinct seasonal change, higher in summer because of surface refraction favored by maximum water vapor pressure. All frontal passage lowered transmission but in relation to angle of passage with the transmission path. Better transmission in calm weather may be due to favorable stratification otherwise reduced by turbulence. *Subject Heading:* **1. Radio transmission.**—*W.N.*

8I–33 551.594.7

Smyth, J. B. and Trolese, L. G., **Propagation of radio waves in the troposphere.** *Institute of Radio Engineers, N. Y., Proceedings,* 35(11):1198–1202, Nov. **1947.** 6 figs., 21 refs., 3 eqs. **DLC**—A theory based on three experimental types of index of refraction distribution is discussed here. The refracting stratum treated as a plane refracting layer, generally agrees with propagation experiments as conducted over a 90 mile nonoptical over-water path at San Diego, records of which are shown and presented graphically for comparison with calculated results. *Subject Headings:* **1. Propagation experiments 2. Refractive index variations 3. San Diego, Calif.**—*W.N.*

8I–34 551.594.7

Wickizer, G. S. and Braaten, A. M., **Propagation studies on 45.1, 474 and 2800 megacycles within and beyond the horizon.** *Institute of Radio Engineers, N. Y., Proceedings,* 35(7):670–680, July **1947.** 20 figs., 3 tables, 8 refs., 3 eqs. **DLC**—Continuous recordings of field strength on 474 and 2800 megacycles, over a period of 13 months, revealed maximum values three to four times the free-space field at distances of 42.5 and 70.1 mi from the transmitting site atop Empire State Building, N. Y. C. Recordings on 45.1 megacycles during the same period, on a reduced schedule, did not exhibit the large variation found on the higher frequencies. Refraction was found to be greater in summertime, the strongest periods occurring during night or early in the morning. Refraction greater than normal was not evident when the average wind velocity was above 13 miles per hour. A study of weather conditions during the periods of strongest refraction indicated that roughly 60% of the gradients were of the frontal type, involving different air masses, and approximately 60% of the gradients were higher than 100 ft above the earth's surface. *Subject Headings:* **1. Field strength fluctuations 2. Superrefraction.**—*Authors' abstract.*

1948

8I–35 551.524.4:551.571.4:551.594.7

Booker, H. G., **Some problems in radio meteorology.** *Royal Meteorological Society, Quarterly Journal,* 74(321–322):277–315, July–Oct. **1948.** 19 figs., 2 tables, 21 refs., 35 eqs. **DWB, DAWS**—Superrefraction of radio wave lengths less than about 10 m in the lower troposphere may occur with an inversion of temperature exceeding 5°F/100 ft, or a lapse of humidity greater than 0.52 gm/kg/100 ft, or by a combination of these. The principal meteorological phenomena likely to cause radio refraction are nocturnal radiation inversions over land, advection of warm dry air over a cold surface, and low-level subsidence inversions. Coastal and sea areas of the world found during World War II to be subject to superrefraction are listed. The conjugate power-law theory of eddy diffusion is applied to ascertain the profiles of temperature and humidity associated with inversion phenomena, and a comparison is made with observed temperature and humidity profiles (M.I.T. data). The comparison suggests that lack of complete correspondence is attributable to the assumption that the coefficient of eddy diffusion is constant with height. (*Same item as* 7F–102, June 1956, *MAB.*) *Subject Headings:* **1. Superrefraction 2. Inversion effects on radio wave propagation.**—*R. S. Quiroz.*

8I–36 551.5:621.396

Durkee, A. L., **Results of microwave propagation tests on a 40-mile overland path.** *Institute of Radio Engineers, N. Y., Proceedings,* 36(2):197–205, Feb. **1948.** 15 figs. **DLC**—The 2-year (July 1943–Feb. 1945) tests with 1.25 to 42 cm wave lengths over a 40 mi path from New York to Neshanic showed waves well above 3 cm to be preferred rather than lesser wave lengths. The influence of meteorological, as well as diurnal and seasonal, factors on propagation is shown graphically and discussed. *Subject Headings:* **1. Propagation experiments 2. Directed radio transmission 3. Wave length selection.**—*W.N.*

8I–37 551.510.52:551.501.8

Friend, Albert W., **Continuous tropospheric soundings by radar.** *Institute of Radio Engineers, N. Y., Proceedings,* 36(4):501–503, April **1948.** 5 figs., 6 ref. **DLC**—Brief report on experiments conducted on 2800 Mc (10.7 cm wave length) during 1946–7 with a SCR-584 radar is given. In particular, the "dot" echoes of which up to 200,000 could appear within a 20-mile radius preferably on clear, warm days are considered. The recording procedure outlined yields an applicable method to gain information on upper air strata, wind and clouds. *Subject Heading:* **1. Radar tropospheric soundings.**—*W.N.*

8I–38 551.593.1

†*Gerson, N. G., **Variations in the index of refraction of the atmosphere.** *Geofisica Pura e Applicata,* 13(3–4):88–101, Sept.–Oct. **1948.** 12 figs., 2 tables, 22 refs., 26 eqs. **DLC** (QC801.G37)—Several aspects of the refractive index variations are considered such as: (1) throughout the year at the earth's surface and (2) seasonally in several air masses, where monthly and seasonal values are employed. Graphical presentation of the variation of the refractive index with altitude is given for the more general air masses. Up to 6 km altitude, tropical and monsoon air masses had highest values, arctic air masses the lowest. Rate of decrease with altitude (up to 6 km) varies in accord with air masses, rate of decrease was more constant in upper air masses than in lower. *Subject Heading:* **1. Refractive index variations.**—*W.N.*

8I–39 551.594.7

Hamlin, E. W. and Gordon, W. E., **Comparison of calculated and measured phase difference at 3.2 cm wavelength.** *Institute of Radio Engineers, Proceedings,* 36(10):1218–1223, Oct. **1948.** 9 figs., 3 refs., 7 eqs. **DLC**—Radio propagation and associated meteorological measurements, made by the Electrical Engineering Research Laboratory of the University of Texas during April, 1946, on a path from Gila Bend to Sentinel in the Arizona desert, show that, for meteorological conditions that could be represented by a linear M curve, the magnitude and phase of the field resulting from propagation over a 27-mi path on 3 cm could be calculated on the basis of a direct wave, and one reflected from a surface tangent to the actual profile at the point of reflection. Apparent reflection coefficients between 0.3 and 0.8 were found for desert sand on 3 cm for this path. *Subject Headings:* **1. Propagation experiments 2. Radio-weather conditions 3. Directed radio transmission 4. Texas.**—*Author's abstract.*

8I–40 551.594.7:621.396

*Kerr, Donald E., **Propagation of very short waves, Pt. 1,** *Electronics,* 21(1):124–128, Jan. **1948.** 6 figs., 2 refs., 26 eqs. **Pt. 2,** *Ibid.,* 21(2):118–123, Feb. **1948.** 5 figs., ref., 8 eqs. **DLC**—An excellent clear-cut outline with new light on the subject, comprising the M.I.T. Radiation Laboratory experiments in summarized form along with those of many other investigators from various parts of the world. In the first part, author discusses the one way propagation in free space and over a spherical earth. Second part is devoted to surface reflection effects, radar type propagation, and finally, propagation caused by atmospheric refraction which is given particular consideration. The atmospheric index n depends on pressure temperature and humidity but is independent of wavelength down to about 1 cm (where absorption becomes important). The index gradient dn/dz involves both the gradients of the atmospheric quantities and their values, resulting in the possibility of wide range of effects on the modified index profile of which the most important are (shown in fig. 9): (1). In a completely vertically mixed atmosphere dN/dz is nearly constant (0.036 per ft defined as giving standard refraction). (2). Temperature inversions tends to make $dN/dz < 0.036$ and (3). Decrease of water vapour pressure or concentration with height trends to make $dN/dz < 0.036$. (4). Increase of humidity (the relative, not a conservative property of atmosphere, is considered a useless quantity here) with height, tends to make $dN/dz > 0.036$. *Subject Headings:* **1. Propagation experiments 2. Refractive index variations.**—*W.N.*

8I–41 551.594.6

Kerr, J. F., **Radio superrefraction in the coastal regions of Australia.** *Australian Journal of Scientific Research, Ser. A, Physical Sciences,* 1(4):443–463, Dec. **1948.** 14 figs., 9 refs. **DLC, DWB**

—A study of geographical and meteorological factors affecting superrefraction of radio or radar echoes in and near Australia, based on reports from 112 R.A.A.F. radar warning stations, 1944–1945. (*Same item as* 2.3–173, March 1951, *MAB* and 4D–186, April 1953, *MAB.*) *Subject Headings:* **1. Radar echoes 2. Anomalous radio propagation 3. Australia.**

8I–42 551.594.7:551.5

Klinger, Hans Herbert, **Erzeugung, Ausbreitung und Anwendung von Millimeter-wellen.** [Generation, propagation and application of millimetre waves.] *Das Elektron*, Munich, 2(10):213–214, Oct., **1948. DLC**—Propagation of millimetre waves is characterized by scattering-absorption (scattering and refraction by water drops, absorption by water vapor and oxygen) increasing proportional with distance of transmission and reciprocal proportional to the fourth power of the wave length. The absorption is explained by certain quantum conditions of the molecules of oxygen and water vapor which frequencies do appear in these very short waves. (Oxygen has an absorption region at 2.5 mm and 5 mm waves, water vapor at 1.34 cm and some mm waves.) Propagation experiments with 6 mm waves (beyond molecular absorption) shows that in a nonturbulent atmosphere, transmission can be made over 30 km distance. *Subject Headings:* **1. Microwave propagation 2. Atmospheric influences 3. Absorption.**—*W.N.*

8I–43 621.396

Norton, Kenneth A., **Propagation in the FM broadcast band.** *Advances in Electronics*, 1:381–423, **1948.** 16 figs., table, 28 refs., 8 eqs. **DLC**—In his introduction author explains FM propagation generally and subsequently discusses the following topics: Interference due to long distance ionospheric propagation. Effects of radio noise on broadcast reception. Effects of antenna height and terrain on the effective transmission range over a smooth spherical earth. Effects of irregularities in the terrain. Systematic effects of terrain and tropospheric ducts. Tropospheric waves resulting from reflection at atmospheric boundary layers. Combined effects of ducts and random tropospheric waves. Calculated service and interference ranges of FM broadcast stations. The efficient allocation of facilities to FM broadcast stations. Optimum frequency for an FM broadcast service. *Subject Headings:* **1. Radiocommunication range 2. FM wave band.**—*W.N.*

8I–44 551.594.7

Norton, Kenneth A. and Kirby, R. S., **A theory of the effect of irregularities in terrain on radio propagation at frequencies above 300 mc.** This was attached as an appendix to a statement presented by K. A. Norton at the Sept. 20, 1948, Television Hearing before the Federal Communications Commission relative to the comparative average to be expected from television broadcasting stations operating in the 50 to 1000 mc range. *Subject Headings:* **1. Terrain effects on radio propagation 2. Television.**

8I–45 551.594.7:621.396

Perlat, Andrée, **Météorologie et radioélectricité.** [Meteorology and radioelectricity.] *L'Onde Électrique*, 28:44–54, **1948.** 18 figs. **DLC**—The first part of this article deals with the uses of radio and radar in meteorology. Pt. 2 describes with diagrams the effect of meteorological phenomena on the propagation and refraction of waves of frequency exceeding 60 Mc/s. Factors considered are variation of refractive index with height, effect of turbulence, advection, nocturnal cooling, fog, subsidence, fronts and the formation of ducts. (*Same item as* 5J–129, Oct. 1954, *MAB.*) *Subject Headings:* **1. Radio transmission ducts 2. Electromagnetic wave refraction 3. Radio meteorology.** —*C.E.P.B.*

8I–46 551.594.7:621.396.8

Price, W. L., **Radio shadow effects produced in the atmosphere by inversions.** *Physical Society of London, Proceedings*, 61(343):59–78, July 1, **1948.** 9 figs., 10 refs., 32 eqs. **DLC**—For frequencies around 200 Mc/s it appears likely that certain predictable weather situations are associated with shadow zones (airplanes will not be detected). Author concludes with advice to those using high frequency sets in localities subject to strong inversion. At times, failure in system may occur due to meteorological conditions. *Subject Headings:* **1. Microwave propagation 2. Radio meteorology 3. Inversions.**—*W.N.*

8I–47 551.594.7:551.510.52

*Rydbeck, Olof E. H., **On the propagation of waves in an inhomogeneous medium.** *Göteborg, Sweden. Chalmers Tekniska Högskola, Handlingar*, No. 74; Reports from the Research Laboratory of Electronics, No. 7, **1948.** 34 p. 7 figs., 18 refs., 137 eqs. **DLC**—The paper opens with a discussion of, and the connection between, the existing theoretical methods of propagation, both in slightly and strongly homogeneous media. Author proved that the reflection intensity as calculated by the good path method is correct. A complete, mathematical expression for the wave phase is

presented. Finally the circuit relation of the wave equation is demonstrated in the light of (1) ALFVEN's magneto hydro-dynamic waves in the sun and (2) duct propagation of microwaves in the lower troposphere. *Subject Headings:* **1. Microwave propagation 2. Wave theories.**—*W.N.*

8I–48 551.594.6:551.5:621.396

Smith-Rose, R. L., **Meteorology and the propagation of radio waves.** *Nature,* London, 161(4082):145–146, Jan. 24, **1948. DWB**—Review of work done during war, especially reports prepared for general distribution after the war, on determination of the effect of various weather conditions on radio and radar propagation. (*Same item as* 1–176, Jan. 1950, *MAB.*) *Subject Headings:* **1. Sferics 2. Radio communication.**

8I–49 621.396.6

Straiton, A. W. and Gerhardt, J. R., **Results of horizontal microwave angle-of-arrival measurements by the phase difference method.** *Institute of Radio Engineers, N. Y., Proceedings,* 36(7):916–922, July **1948.** 12 figs., 2 tables, eqs. **DLC**—Description of radio and meteorological equipment employed along with results obtained are discussed here. The observations were conducted at Corpus Christi, Texas. Sixty percent of the measurements showed angular deviation less than 0.03° and was found to be directly proportional to path length if constant gradient persists over the path. The angle of arrival as a function of gradient of index of refraction is considered. *Subject Headings:* **1. Radio instruments 2. Propagation experiments 3. Angle of arrival.**—*W.N.*

1949

8I–50 551.594.7:621.396.8

Booth, R. P., **Microwave propagation tests.** *Bell Laboratories Record,* N. Y., 27(9):334–335, Sept. **1949.** 4 figs. **DLC**—This brief article deals with the recordings of fading made in 1948 in Ohio and in the Great Salt Lake Desert, Utah. The experiments at the latter area are the more interesting as this area is noted for climatic conditions producing fantastic images at optical frequencies. *Subject Headings:* **1. Microwave propagation 2. Radio meteorology 3. Utah.**—*W.N.*

8I–51 551.594.7:551.594.6:621.396.812.4

Boyd, J. E.; Martin, Roy A.; Yoe, Catherine and Brown, F. B., **Effect of atmospheric conditions on the propagation characteristics of electromagnetic waves in the microwave region.** Georgia Institute of Technology. State Engineering Experiment Station, Contract W28-099-ac-175, Progress Report, No. 21, Feb. 28, **1949.** 33 p. 10 figs., foot-refs. **DWB**—Preliminary results of measurements (May 1947–Jan. **1949**) of propagation at L, S, and X bands over about 50 miles rough paths in Georgia are presented in tables, graphs and charts and discussed along with the weather conditions and the probable effect of various meteorological factors on propagation. *Subject Heading:* **1. Microwave propagation.**—*W.N.*

8I–52 551.510.535:621.396

Boyd, J. E.; Martin, Roy A.; Brown, F. B. and others, **The effect of atmospheric conditions on the propagation characteristics of electromagnetic waves in the microwave region.** Georgia Institute of Technology. State Engineering Experiment Station, Contract W28-099-ac-175, Project 109-8, Progress Reports, No. 16, 18, 19, 22, Jan. 31, May 31, Aug. 31, **1948,** and May 31, **1949.** 4 pieces. figs., refs. **DWB**—The work under this contract is a thorough investigation of point-to-point radio propagation over 30–50 miles paths with varying microwave frequencies (L, S and X band) and simultaneous detailed meteorological measurements along the paths. The contemplated comparison and analysis of the propagation and the meteorological data obtained are aimed to (1) determine the effects of various meteorological conditions on radio propagation and (2) to determine an optimum frequency. Radiosondes, balloon sounding (meteorograph), aircraft sounding and automatic weather stations were used in the investigation. The data obtained are presented graphically in: Report No. 16, from Oct. 10 to Nov. 21, 1947. Report No. 18 reviews and schedules future work. No data. Report No. 19 contains description of the automatic weather station, and the data on propagation and meteorological measurements from June 29 through July 12, 1948, and from July 27 through Aug. 9, 1948, and Report No. 22 gives review and schedule of future work. No data. (*Same item as* 6D–29, April, 1955, *MAB.*) *Subject Headings:* **1. Radio wave propagation 2. Ionospheric soundings 3. Meteorological effects. I. Yoe, Catherine II. Roberts, T. E. III. Lowance, F. E.**—*W.N.*

8I–53 551.594.7:621.396.029.6:538.3

Boyd, J. E.; Yoe, Catherine; Stringer, F. D. and Kent, C. F. (*all of Georgia Inst. of Tech.*), **The effect of atmospheric conditions on the propagation characteristics of electromagnetic waves in the microwave region.** Georgia Institute of Technology. State Engineering Experiment Station, Contract W28-099-ac-175, Supplementary Report, No. 1, Aug. 25, **1949.** 45 p. 39 figs., table.

DWB—Whereas earlier reports dealt with optical paths (*see item* 8I–52) this supplementary report deals with nonoptical paths and contains compact data on signal strength and M-curves with simultaneous meteorological observations obtained during the fall and winter of 1948–1949 at L, S, and X bands over 47 mile paths, profiles of which are presented along with operational characteristics for each of the bands. *Subject Headings:* **1. Microwave propagation 2. Electromagnetic wave propagation.**—*W.N.*

8I–54 551.594.7:551.510.535

*†Bremmer, H., **Terrestrial radio waves; theory of propagation.** New York, Elsevier Publ. Co., **1949.** 343 p. 91 figs., numerous refs and eqs. **DLC**—The theoretical aspects of propagation are discussed. The classic papers of Van der Pol and Bremmer (1930) on propagation over a curved earth are included. *Subject Heading:* **1. Radio wave propagation theory.**—*W.N.*

8I–55 551.594.7

Crawford, A. B., **Radar reflections in the lower atmosphere.** *Institute of Radio Engineers, N. Y., Proceedings,* 37(4):404–405, April **1949.** 2 figs., 3 refs. **DLC**—"Angels" as produced artificially and consisting of boundaries of temperature, humidity, or turbulence gave no visual radar picture, but insects did. Angels may be reflections from insects and/or birds, author suggests. The observations were made Jan. 1949 at Gila Bend, Ariz., using a high-sensitive radar operating at 3.2 and 1.25 cm. wave lengths. *Subject Heading:* **1. Angels.**—*W.N.*

8I–56 551.594.6

Dattan, W., **Beitrag zur unnormalen Brechung ultrakurzer Wellen in der Atmosphäre.** [Contribution to abnormal refraction of ultra-short waves in the atmosphere.] *Zeitschrift für Meteorologie,* 3(1/2):50–51, Jan./Feb. **1949.** fig., ref. **DWB**—The 7.9 m wave was received at a distance of 180 km, due to reflection from a relatively low layer in the atmosphere. (*Same item as* 11–176, Nov. 1950, *MAB.*) *Subject Headings:* **1. Ultra-short waves 2. Sferics.**—*C.E.P.B.*

8I–57 551.594.7:551.510.52

Davies, H., **A preliminary study of some results from the radio-meteorological investigation conducted in Canterbury.** *Royal Society of New Zealand, Transactions,* 77(5):78–85, Nov. **1949.** 10 figs. **DLC**—The mechanics of orthodox propagation of cm waves in a well mixed atmosphere are discussed, including lobe distribution above the horizon due to interference of direct and reflected rays. Anomalous propagation in a duct is considered and the effect of a land-sea transition on the vertical structure of potential temperature, specific humidity, modified refractive index and duct shape in a typical NW advective duct are illustrated. These cause considerable superrefraction of wave-lengths of 3 and 10 cm. (*Same item as* 2.8–174, Aug. 1951, *MAB.*) *Subject Headings:* **1. Radio meteorology 2. Radio transmission ducts.**—*C.E.P.B.*

8I–58 551.501.8:551.510.52

Friend, A. W., **Theory and practice of tropospheric sounding by radar.** *Institute of Radio Engineers, N. Y., Proceedings,* 37(2):116–138, Feb. **1949.** 17 figs., 29 refs., 116 eqs. **DLC**—Microwave echoes appear to originate in the fine layers of air mass boundaries and turbulent regions. Author proposes the use of a radar set with three beam systems to obtain data of more exact nature: (1) 400 Mc for recording major dielectric phenomena, (2) 4000 Mc for recording fine structure effects and (3)40,000 Mc for detection of smallest concentration of minute precipitate or dust particles. *Subject Heading:* **1. Radar tropospheric soundings.**—*W.N.*

8I–59 551.594.7:551.501.81

Gordon, W. E., **A theory on radar reflections from the lower atmosphere.** *Institute of Radio Engineers, N. Y., Proceedings,* 37(1):41–43, Jan. **1949.** 13 refs., 7 eqs. Also issued as: Cornell University. School of Electrical Engineering, Ithaca, N. Y. Its Electrical Engineering Research Laboratory, Contract N6onr-266, T.O. 2, Report No. 27, Jan. 1, **1949.** **DLC**—A theory is presented, supported by several sample sets of data, which indicate that the curious phenomenon dubbed "angels" (radar reflections from the lower atmosphere) may be attributed to sharp changes in the dielectric constant. The required magnitudes of the changes are computed from reflection theory and compared to sample meteorological data obtained from rapid-response instruments. The near-discontinuities in the dielectric constant are produced by atmospheric turbulence. It is proposed that the observed radar reflections are the result of turbulent motion in the lower atmosphere. *Subject Headings:* **1. Angels 2. Radio-weather conditions.**—*Author's abstract.*

8I–60 551.524:551.571:621.396.11

Grün, Artur and Kleinsteuber, Werner, **Der durch den Feuchtigkeits und Temperaturgang der unteren atmosphärischen Schichten verursachte Interferenzschwund im Dezimetergebiet.** [The

interference fading in the decimetre band, caused by the temperature and humidity variation of the lower layers of the atmosphere.] *Archiv der Elektrischen Übertragung*, 3(6):209–219, Sept. **1949.** 18 figs., 10 refs., 20 eqs. **DLC**—Since the changeable curvature of a ray is due to the weather-dependent gradient of the index of refraction, the difference in variation of both rays (i.e., the direct and the earth reflected) gives simple formulas for calculation of the field strength. Observational results evaluated by this method were found in good agreement with available meteorological observations. *Subject Headings:* **1. Microwave propagation 2. Refractive index 3. Field strength calculation.**—*W.N.*

8I–61 621.396.6

Harris, Donald B., **A forward-transmission echo-ranging system.** *Institute of Radio Engineers, Proceedings*, 37(7):767–770, July **1949.** 4 figs., 15 eqs. **DLC**—A new system using radar techniques is described. Receiver and transmitter are placed at separated locations. Range of target to receiving station being equal to difference in paths between direct and reflected waves divided by the versine of the angle of elevation of the receiving antenna, the radial waiting speed is made proportional permitting a PPI presentation of propagation path as seen from the side. Application of the system to propagation studies is promising. *Subject Headings:* **1. Propagation experiments 2. Directed radio transmission 3. Radio instruments.**—*W.N.*

8I–62 551.594.7:551.589.1:621.396

***Herath, Fritz, Inversionsstudie auf Grund der Lindenberger Fesselaufstiege mit besonderer Berücksichtigung der Ultrakurzwellenausbreitung.** [Inversion study based on the captive balloon ascent at Lindenberg Observatory, with special consideration to the propagation of ultra-short waves.] *Germany. Deutscher Wetterdienst in der US-Zone, Berichte*, No. 9, **1949.** 41 p. 20 figs., 29 tables, 57 refs. **DWB**—In an extensive study of inversions $\geqq 3.0°C$, which appeared between the ground surface and 2000 m, 17,586 captive balloon ascents and kite flights at Lindenberg Observatory, in the years of 1903–1925, were analyzed. Annual variation, frequency and various characteristics of inversions are presented. The strongest inversion occurred in Dec. when temperature on the ground was $+15.2°C$, and at the altitude of 850 m $+1.9°C$. The strong inversions $\geqq 10.0°C$ make 3.7% of all the cases. Temperature gradient in the free inversions is calculated in order to calculate the propagation of the ultra-short waves. Observed maximal value was 71°/100 m. The maximal value of ideal inversions calculated after A. Wegener was found to be approximately 43°. *Subject Headings:* **1. Inversion 2. Microwave propagation 3. Lindenberg Observatory 4. Germany.** —*W.N.*

8I–63 551.594.6

Israel, H. and Sommermeyer, K., **Über partielle Reflexion elektromagnetischer Wellen in der Troposphäre.** [On the partial reflection of electro-magnetic waves in the troposphere.] *Zeitschrift für Meteorologie*, 3(1/2):32–39, Jan./Feb. **1949.** 2 figs., 12 refs., eqs. **DLC**—A marked partial reflection of electromagnetic waves by atmospheric formations can only occur if the dielectric constant at the reflecting surface changes considerably in a distance shorter than or at the most of the same order as the wave length. Most reflections at inversions etc. are limited to waves of a few hundred meters or more. Decimeter waves can be reflected by water vapor discontinuities in transient turbulent eddies, mostly over the sea, and in thunderclouds and the space above them. Uniform ionization density in a thundercloud cannot explain reflection, and authors suggest local ionization in discharge channels. (*Same item as* 11–175, Nov. 1950, *MAB.*) *Subject Heading:* **1. Electromagnetic wave reflection.**—*C.E.P.B.*

8I–64 551.510:621.396.11

Jones, F. E. and Cornford, E. C., **The measurement of the velocity of propagation of centimetre radio waves as a function of height above the earth, Part 2.** *Institution of Electrical Engineers, Proceedings, Pt. 3*, 96(43):447–452, Sept. **1949.** 8 figs., 7 tables, 5 refs., 6 eqs. **DLC**—Includes nomogram for computing variation of refraction index of atmosphere with height above earth. Velocities given for propagation between ground and 10, 20 and 30 thousand feet, respectively (186,233; 186,246; and 185,256 miles/sec). (*Same item as* 2.3–41, March 1951, *MAB.*) *Subject Headings:* **1. Radio transmission 2. Atmospheric structure.**—*M.R.*

8I–65 551.510.52:621.396.11

Jones, R. F., **Low-level atmospheric ducts.** *Nature*, London, 163(4147):639, April 23, **1949.** 2 refs. Discussion by J. S. McPetrie and B. Starnecki p. 639. **DLC**—Jones presents a plausible hypothesis for the formation of low-level radio transmission ducts over the sea during strong wind conditions and during still air. Humidity lapse rates when strong winds come from cold areas, and temperature and humidity lapse rates when winds come from warm areas, create conditions favorable for these "ducts" in the lower 100 ft above the sea. Presence of spray also considered

important during turbulent conditions (discussion). (*Same item as* 10–49, Oct. 1950, *MAB.*) *Subject Heading:* **1. Radio transmission ducts.**—*M.R.*

8I–66 551.594.6:551.5:621.396

Krasil'nikov, V. A., **O vliianii pul'satsii koeffitsienta prelomleniia v atmosfere na rasprostranenie ul'trakorotkikh radiovoln.** [On the influence of pulsations of the index of refraction in the atmosphere on the propagation of ultra-short radio waves.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geogr. i Geofiz.*, 13(1):33–57, **1949.** 7 figs., table, 16 refs., 60+ eqs. **DWB, DLC**—Fluctuations in the index of refraction of the atmosphere, due to temperature pulsations, causing fluctuations in signal strength, phase, etc., (fading) of high frequency radio waves, both up to and beyond the horizon. Comparison of theory with experimental results. (*Same item as* 1–77, Jan. 1950, *MAB.*) *Subject Headings:* **1. Spherics 2. Radio communication.**

8I–67 551.510.535:621.396.11

*Lehfeldt, Wilhelm, **Die Ausbreitung der Ultrakurzen (quasioptischen) Wellen.** [Propagation of ultra-short (quasi-optical) waves.] *Archiv der Elektrischen Übertragung*, 3(4–9):137–142, 183–186, 221–228, 265–269, 305–312, 339–346, July–Dec., **1949.** 44 figs., 8 tables, 49 refs., num. eqs. **DLC**—This detailed study contains two main parts. The first part discusses such problems as: (1) refraction of the ray in a homogeneous atmosphere, (2) refraction and reflection in an inhomogeneous atmosphere, (3) reflections and blurred boundaries, (4) influence of ions upon reflection and refraction, (5) suppression by scattering and absorption. Influence of the earth's surface. In the second part, devoted to discussion of the results obtained by measurement, the following topics are highlighted: (1) The technique of measurements, (2) Measurements of over-land propagation, (3) Statistical over-land results, (4) Measurements over the sea, and at 9 cm wavelength over plain lowland, (5) Ranges. *Subject Headings:* **1. Microwave propagation 2. Propagation experiments.**—*W.N.*

8I–68 621.396:551.5

Mcpetrie, J. S.; Starnecki, B.; Jarkowski, H. and Siscinski, L., **Oversea propagation on wavelengths of 3 and 9 centimeters.** *Institute of Radio Engineers, Proceedings*, 37(3):243–257, March **1949.** 16 figs., 2 tables, 10 refs., 5 eqs. **DLC**—Tests 1943–1946 to determine meteorological factors governing propagation of cm waves are discussed here. The results summarized cover continuous recordings of field strength at the over-sea paths 60 and 200 miles off the west coast of Great Britain. Radio results and meteorological parameters are considered in relation to current propagation theories. *Subject Headings:* **1. Propagation experiments 2. Directed radio transmission 3. Radio-weather conditions.**—*W.N.*

8I–69 551.594.7:621.396

Perlat, A., **Effet des conditions météorologiques sur la propagation des ondes radioélectriques a fréquence élevée. Note preliminaire.** [Effect of meteorological conditions on the propagation of high-frequency waves: preliminary note.] *Journal Scientifique de la Météorologie*, 1(4):131–138, **1949.** 8 figs., tables. **Cas des ondes de 150 Mc.** [Case of waves of 150 Mc.] *Ibid.*, 2(8):101–107, Oct.–Dec. **1950.** 3 figs. French, English and Spanish summaries p. 131, 101. **DWB**—The first memorandum discusses the meteorological conditions for the existence of ducts giving abnormally large reception range of waves shorter than 10 m, making use of radiosonde ascents. In the second paper several cases of very abnormal range (300–400 km) of 2 m waves in Western Europe are examined. They appear to require the presence of a subsidence area, pressure above 1013 mb and vapor pressure above 11 mb, and no fronts across the track. (*Same item as* 5J–134, Oct. 1954, *MAB.*) *Subject Heading:* **1. Radio transmission ducts.**

8I–70 551.594.7

Rocco, M. D. and Smyth, J. B., **Diffraction of high-frequency radio waves around the earth.** *Institute of Radio Engineers, N. Y., Proceedings*, 37(10):1195–1203, Oct. **1949.** 14 figs., 17 refs. **DLC**—This paper reports nonoptical height-gain measurements on a remarkably uniform desert link at frequencies of 25, 63, 170, 520, 1000, 3000, and 9375 Mc using horizontal polarization. It has been shown that when the index of refraction of the atmosphere is a linear function of elevation, the problem of refraction and diffraction may be presented approximately by a problem in diffraction alone. Data taken under linear and slightly nonlinear index of refraction gradients are compared with fields predicted by standard diffraction theory. A mechanism other than diffraction is required to explain the higher-frequency fields observed under standard meteorological conditions. *Subject Heading:* **1. Radio wave diffraction.**—*Authors' abstract.*

8I–71 551.594.7:551.510.52(02)

†U. S. Office of Scientific Research and Development. National Defense Research Committee, **Radio wave propagation: consolidated summary technical report of the Committee on Propagation.**

Charles R. Burrows, Chairman. Stephen S. Attwood, editor. N. Y., Academic Press, **1949.** 3 vol. in 1. 548 p. figs., tables, bibliogs., eqs. "Reprinting, with some omissions of the 3 volumes pub. 1945? in a limited edition." Bibliog. p. 514–530. General bibliog. of reports on tropospheric propagation, Report WPG-14 (Columbia Univ. Wave Propagation Group) p. 530–548. numerous figs., tables, bibliogs and eqs. **DLC** (QC661.U63)—This comprehensive work on radio wave propagation through the troposphere comprises scientific information and reports of experiments. Vol. 1, entitled **Technical survey,** is largely a critical and general review of the technical developments of the tropospheric propagation problems. The general theory of standard and of nonstandard propagation with descriptions and results of transmissions as well as the meteorological factors affecting propagation and attenuation are treated. Vol. II, entitled **Radio wave propagation,** is devoted to meteorology. Such subjects as theory, equipment, development of forecasting techniques are dealt with in the first part; second part contains significant information and data on subjects such as reflection coefficients, dielectric constant, absorption, scattering (rain, drop size) echoes, targets, etc. Radar, in its relation to these factors, is given a detailed treatment. A consideration of angle-of-arrival is included. Vol. III, entitled **The propagation of radiowaves through the standard atmosphere,** is of particular interest to the (meteorological) radar operators. Propagation of waves above 30 Mc is discussed specifically here. Six transmission experiments at such different geographical locations as Massachusetts Bay, San Diego, Arizona, Antigua, West Indies and Great Britain are considered in detail in order to correlate practice with the theories discussed in Vol. I and the meteorological factors discussed in Vol. II. The comprehensive bibliographies consist of 450 entries for Vol. I and 123+ for Vol. II and the general bibliography of reports (557 entries) includes the works from numerous service and civilian organizations in the U. S., Great Britain, Canada, New Zealand and Australia. *Subject Headings:* **1. Tropospheric propagation 2. Radar meteorology 3. Microwave propagation. I. Burrows, Charles R. II. Attwood, Stephen S.** (*ed.*). —*W.N.*

8I–72 551.594.7:621.396

Unwin, R. S., **Some problems and techniques involved in the radio-meteorological investigation conducted in Canterbury.** *Royal Society of New Zealand, Transactions,* 77(5):85–91, Nov. **1949.** 7 figs., 4 refs. **DLC**—Study of radar ducts made during late 1946 and 1947 during föhn (off-shore) wind on coast of New Zealand—range 200 km from coast and 600 m above sea level. Isopleths of atmospheric factors and refraction index. *Subject Headings:* **1. Radio meteorology investigations 2. Radar transmission ducts 3. Canterbury, New Zealand.**—*M.R.*

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8I–73 621.396.6

Aikens, A. J. and Lacy, L. Y., **A test of 450 megacycle urban area transmission to a mobile receiver.** *Institute of Radio Engineers, Proceedings,* 38(11):1317–1319, Nov. **1950.** 4 figs., ref. **DLC**—Measurements were made of mobile radio-telephone transmission at 450 Mc in New York City using frequency modulation. Comparison was made with transmission at 150 Mc using identical speech modulation. Effective radiated power was about equal. Direct comparison tests were made with the receivers installed in a moving automobile. The transmitter and the receiver used at 450 Mc were developed especially for the job. The receivers used at the two frequencies had substantially the same noise figures. The tests permitted estimates of the relative magnitudes of the shadow losses at the two frequencies and included measurements of rf noise. Subjective tests of circuit merit comparing the two frequencies were made by a number of observers. *Subject Headings:* **1. Propagation experiments 2. FM wave band 3. Radio instruments.**—*Authors' abstract.*

8I–74 551.508.85

Aslakson, Carl I. and Fickeissen, Omar O., **The effect of meteorological conditions on the measurement of long distances by electronics.** *American Geophysical Union, Transactions,* 31(6): 816–826, Dec. **1950.** 6 figs., 3 tables, 6 refs., 10 eqs. **DWB**—Practical methods for correcting long distance electronic measurements, limited to frequencies peculiar to shoran or from about 220 to 250 megacycles per second for variations in meteorological conditions, are described The following topics are considered: the technique of making meteorological observations by airplane; the empirical relationship expressing the index of refraction in terms of total pressure and water vapor pressure in millibars and absolute temperature (relationship used for U. S. Air Force projects); the manner in which curvature of the shoran ray affects geodetic distance; the methods of correcting for ray path curvature used by the U. S. Air Force, by Canada and by KROLL (U. S. Army Map Service); the effect of meteorological variations upon the velocity correction; the analysis of errors due to the uncertainty of the velocity of radio waves in a vacuum and to the uncertainty of the index of refraction of moist air. (*Same item as* 2.9–32, Sept. 1951, *MAB.*) *Subject Headings:* **1. Long distance measurement 2. Radio transmission ducts 3. Electronic measurement.**—*I.L.D.*

8I–75 551.594.7:551.510.52

Booker, H. G. and Gordon, W. E., **A theory of radio scattering in the troposphere.** *Institute of Radio Engineers, Proceedings*, 38(4):401–412, April **1950.** 3 figs., 12 refs., 7 eqs. **DLC**—The theory of scattering by a turbulent medium is applied to scattering of radio waves in the troposphere. Values of the scale of turbulence and of the departure of refractive index from mean expected on meteorological grounds are fully adequate to explain the scattered field strengths observed experimentally. *Subject Headings:* **1. Microwave propagation 2. Radio wave scattering theories.**—*From author's abstract.*

8I–76 551.510.52:621.396.11

Booker, H. G. and Gordon, W. E., **Outline of a theory of radio scattering in the troposphere.** *Journal of Geophysical Research*, 55(3):241–246, Sept. **1950.** 2 figs., 7 refs., 9 equations. **DWB**—Observations in Caribbean Sea and elsewhere showed that field strength well below the horizon decreased more slowly than on diffraction theory and suffered violent fading. This is explained by scattering from turbulence in the region of high field strength beyond the horizon. (*Same item as* 2.5–51, May 1951, *MAB.*) *Subject Headings:* **1. Radio transmission ducts 2. Radio wave scattering theories.**—*C.E.P.B.*

8I–77 551.594.7:621.396.029.6

Boyd, J. E. and Brown, F. B. (*both, Ga. Inst. of Tech.*), **Propagation of 3, 10 and 23 cm waves over a 50-mile optical path.** Georgia Institute of Technology. State Engineering Experiment Station, Contract W28-099-ac-175, Project 109-8, Technical Report, No. 1, March 31, **1950.** 69 p. 30 figs. (1 fold.), table, 11 refs. **DWB**—Experimental measurements of microwave propagation at X, S, and L-bands were over 30 60 mi land path in 1947 and 1948 to obtain data on the effect of ducts, subsidence inversions and turbulence. The 100-day observations are analyzed and presented in statistical distribution curves. The results show that (1) signal strength fluctuations of 20–30 dcb are associated with atmospheric stratifications and that (2) substandard layers may cause strong diffraction. (3) Ray inversion in low level substandard layers may be a possible cause of some large signal fluctuations. (4) Soundings show that ground-based super-refracting layers and ducts usually exist on radiation cooling nights, and that strong substandard layers may also develop during the early morning hours. *Subject Headings:* **1. Microwave propagation 2. Radio transmission ducts 3. Atmospheric turbulence.**—*W.N.*

8I–78 551.594.7

Bremmer, H., **Voortplanting van radiogolven in de troposfeer.** [Propagation of radio waves in the troposphere.] *Nederlands Tijdschrift voor Natuurkunde*, 16(11):275–280, Nov. **1950.** 4 figs., 2 eqs. **DLC**—Discussion of superrefraction, radio ducts and other aspects of radio wave reflection and propagation in the troposphere is illustrated by schematic diagrams and examples. (*Same item as* 2.6–152, June 1951, *MAB.*) *Subject Heading:* **1. Radio wave propagation.**—*M.R.*

8I–79 551.594.7:621.396

Bullington, K., **Radio propagation variations at V.H.F. and U.H.F.** *Institute of Radio Engineers, N. Y., Proceedings*, 38(1):27–32, Jan. **1950.** 5 figs., 8 refs. **DLC**—The variation of received signal with location (shadow losses) and with time (fading) greatly affect both the usable service area and the required geographical separation between co-channel stations. An empirical method is given for estimating the magnitude of these variations at VHF and UHF. These data indicate that the required separation between co-channel stations is from 3 to 10 times the average radius of the usable coverage, and depends on the type of service and on the degree of reliability required. The application of this method is illustrated by examples in the mobile radio-telephone field. *Subject Heading:* **1. Radio wave propagation.**—*Author's abstract.*

8I–80 551.510.52:551.593.1:535.4

Bullington, K., **Propagation of UHF and SHF waves beyond the horizon.** *Institute of Radio Engineers, N. Y., Proceedings*, 38(10):1221–1222, Oct. **1950.** fig. **DLC**—Calculations by usual methods at above 200–500 Mc are severely limited by the uncertainty in choice of effective antenna heights. Clearance may be more important. A useful parameter is the actual clearing divided by the height of the first Fresnel zone. This ratio, as used to express diffraction loss over a knife edge and reflection from a plane surface, is graphically given. *Subject Headings:* **1. Radio wave scattering theories 2. Propagation experiments 3. Topographic influences.**—*W.N.*

8I–81 551.510.52:551.577:621.396.11

Bussey, Howard E., **Microwave attenuation statistics estimated from rainfall and water vapor statistics.** *Institute of Radio Engineers, Proceedings*, 38(7):781–785, July **1950.** 6 figs., 9 refs. **DWB**—Predictions are made from statistical meteorological data of the attenuation of high frequency radio waves (>10,000 Mc) for a 50-km and a 1 km path at Wash., D. C. Water vapor,

rainfall rate and excessive rainfall data are analyzed and charted for the United States. Limitations of data and applications to other parts of the country, discussed. (*Same item as* 2.7–63, July 1951, *MAB.*) *Subject Headings:* **1. Microwave transmission 2. Rainfall intensities 3. Washington, D. C.**—*M.R.*

8I–82 551.508.99:551.510.52:621.396.11

Crain, C. M. and Gerhardt, J. R., **Measurements of the parameters involved in the theory of radio scattering in the troposphere.** Texas. Univ., Electrical Engineering Research Lab., Contract N5ori-136, Report No. 47, Nov. 30, **1950.** 22 p. 11 figs., table, 8 refs. **DWB**—Micrometeorological studies, using a recording refractometer and bead-type thermistor, have been made since 1948 at the Univ. of Texas to determine refractive index in lowest 50 ft of the atmosphere. Traces are presented to show simultaneous recording of refraction index (for microwave transmission at 1, 2, 3, 12 and 32 ft above dry and moist ground and with varying weather conditions and temperature fluctuations). Refractive index related to small scale turbulence, stability, etc. Future program outlined. (*Same item as* 3.4–71, April 1952, *MAB.*) *Subject Headings:* **1. Radio wave scattering theories 2. Refractive index 3. Micrometeorology.**—*M.R.*

8I–83 551.594.7:621.396

Cornell University. School of Electrical Engineering, **Investigation of air-to-air and air-to-ground electromagnetic propagation.** Contract AF 33(038)-1091, Interim Engineering Report No. 1–7, Dec. 27, **1948**/Feb. 27, **1949** to April 27, **1950.** Also: Addendum to Report No. 4, June 27, **1949,** and Supplement to Report No. 6, Jan. 27, **1950.** 9 pieces. figs., refs., eqs. Several pieces typescript or photostat of typescript. **DWB**—The following papers are reviewed: Craig, R. A., **The meteorology of ducts**; Trolese, L. G., **Tropospheric propagation characteristics**; Brooks, F. E., and others, **Dielectric constant measurements**; Hastings, C. E., **Variation in velocity of radio propagation**; Boyd, J. E., **Propagation of 3–10, and 25 cm waves over 50 mile optical and non-optical paths**; Stratton, —, and La Grove, —, **Angle of arrival at low angle of incidence**; and other papers. *Subject Headings:* **1. Tropospheric propagation 2. Radio wave propagation 3. Reviews.**—*M.R.*

8I–84 551.508.82:551.507.321.4:535.2

Georgia Institute of Technology. State Engineering Experiment Station, Atlanta, **Meteorological equipment for microwave propagation studies.** Contract W28-099-ac-175, Project No. 109-8, Technical Report, No. 3, Oct. **31, 1950.** 29 p. 12 figs. **DWB**—A camera meteorograph for captive balloon soundings, and a portable weather station for surface observations are described briefly and illustrated in detail (photographs and wiring diagrams). A 100 ft meteorological tower, and aircraft soundings to 5000 ft for microwave propagation studies in the surface layers of the atmosphere are also described. (*Same item as* 5.5–43, May 1954, *MAB.*) *Subject Headings:* **1. Captive balloons 2. Meteorographs 3. Portable weather stations 4. Microwave propagation studies. I. Widerquist, C. Y. II. Stringer, F. D.**—*M.R.*

8I–85 551.510.52:621.396.11

Gibson, Theodore W., Jr., **Meteorological aspects of radio propagation.** *Weatherwise,* 3(2):32–34, April **1950.** 4 figs. **DWB**—Brief explanation of the effect of varying lapse rates of humidity and temperature on normal and anomalous propagation of micro-waves (television and FM). (*Same item as* 10–48, Oct. 1950, *MAB.*) *Subject Headings:* **1. Radio transmission ducts 2. Television.** —*M.R.*

8I–86 551.515.8:621.396

Jones, R. F., **Low-level atmospheric ducts.** *Nature, London,* 165(4207):971, June 17, **1950. DLC**—Short wave radio ducts across Cardigan Bay occurred in air which had travelled mostly over land. No signals in warm-sector air from far to southwest. (*Same item as* 9–70, Sept. 1950, *MAB.*) *Subject Headings:* **1. Atmospheric disturbances 2. Radio transmission ducts 3. Cardigan Bay, Wales.**—*C.E.P.B.*

8I–87 551.594.7:551.515.8

Karp, Samuel and Sollfrey, William, **Diffraction by a dielectric wedge; with application to propagation through a cold front.** New York Univ., Mathematics Research Group, Research Report No. EM-23, Oct. **1950.** 45 leaves. 13 figs., 10 refs., 7 eqs. Mimeo. **DWB**—The fields diffracted by a dielectric wedge whose dielectric constant differs but slightly from that of its surroundings have been obtained by an approximate method. The fields are expanded in powers of the difference in dielectric constant and only first powers are retained. The approximate fields are then represented as a superposition of plane waves of arbitrary complex direction of propagation, and the resulting integrals evaluated by stationary phase to obtain the asymptotic form of the scattered fields. The reflected and transmitted plane waves agree with those obtained by geometrical optics, and the

angular pattern of the diffracted cylindrical waves is found. The results are applied to the propaga tion of plane waves through a cold front. (*Same item as* 3.2–200, Feb. 1952, *MAB.*) *Subject Headings:* **1. Electromagnetic waves 2. Dielectric wedge 3. Cold fronts.**—*Authors' abstract.*

8I–88 551.501.8:551.594.7(68

King, J. S. (*Weather Bureau, S. Africa*); Hewitt, F. J. (*Telecommunications Research Lab. C.S.I.R. Johannesburg*) and Bozzoli, G. (*Univ. of Witwatersrand, Johannesburg*), **Radio meteorology in southern Africa.** (In: African Regional Scientific Conference, Johannesburg, Oct. 17–28, 1949 [**Proceedings**], 2:41–44. [**1950?**] In English; French summary p. 41.) **DLC** (Q101.A35 1949)— A discussion of the development of radio meteorology in South Africa, of the use of sferics for detecting thunderstorms and the application of microwave radar for precipitation detection in South Africa. The author discusses also the use of radar for upper wind measurement, the influence of meteorological conditions upon radar waves, the meteorological conditions likely to cause superrefraction, etc. A list of radiosonde stations operating in South Africa is given. (*Same item as* 3.10–34, Oct. 1952, *MAB.*) *Subject Headings:* **1. Radio meteorology 2. Sferics 3. Radar storm detection 4. South Africa.**—*I.L.D.*

8I–89 551.510.52:621.396.1

Knighting, E., **Elements of anomalous radio propagation.** *Meteorological Magazine,* (London) 79(933):74–81, March **1950.** 4 figs., 6 photos, 5 refs., 4 eqs. **DWB**—The derivation of a "Modified Refractive Index" (MRI) is stated and it is shown that the conditions necessary to bend a short wave radio beam downwards are a temperature inversion and/or a lapse rate of mixing ratio such that: Temperature gradient (°F per 1000 ft)/7 +2 × Humidity lapse (gm kg per 100 ft)/3 exceeds 1. Observations show that this condition frequently holds, especially over the sea, over a layer ("Duct") on or near the earth's surface. Illustrations of calculated MRI curves are given, and the tracks of beams through or under a duct. Application of electromagnetic wave theory shows why shorter wave lengths are the more affected by superrefraction. (*Same item as* 10–50, Oct. 1950, *MAB.*) *Subject Heading:* **1. Radio transmission ducts.**—*C.E.P.B.*

8I–90 551.551:551.593.12:551.594.7

Megaw, E. C. S., **Scattering of electromagnetic waves by atmospheric turbulence.** *Nature* London, 166(4235):1100–1104, Dec. 30, **1950.** 2 figs., 2 tables, 18 refs. **DLC**—Author first discusses spectra of stellar scintillation due to variable atmospheric refraction. Angular fluctuations near the zenith show that density variation increases roughly as $t^{\frac{1}{3}}$ for periods of 1–50 seconds as required by KOLMOGOROV's theory (1941); above this it varies as $t^{\frac{1}{2}}$. He assumes that all the observations can be accounted for by an average spectrum of turbulence which is a permanent characteristic of the atmosphere. He then considers the scattering of short radio waves by atmospheric turbulence on the basis of observed scattering of a 10 cm wave over 0–300 sea mi. This agrees with the theory of BOOKER and GORDON and with that derived from the scintillation spectrum. (*Same item as* 2.3–106, March 1951, *MAB.*) *Subject Headings:* **1. Turbulence spectrum 2. Scintillation 3. Radio transmission.**—*C.E.P.B.*

8I–91 551.594.7:621.396.8

Millar, J. Z. and Byam, L. A., Jr., **A microwave propagation test.** *Institute of Radio Engineers Proceedings,* 38(6):619–626, June, **1950.** 13 figs., 2 tables. **DLC**—Description of a microwave test conducted over a period of a year, (1946–47) with simultaneous transmissions on 16.2–7.2 and 3.1 cm wavelengths over an unobstructed overland path (Neshanic to New York). Curves show relative field strength. Seasonal (summer and winter) and hourly variations in fading are shown and discussed in connection with weather conditions. *Subject Headings:* **1. Propagation experiments 2. Radio-weather conditions.**—*W.N.*

8I–92 551.510.52:621.396

Milnes, B. and Unwin, R. S., **A radio meteorological investigation in the South Island of New Zealand.** *Physical Society of London, Proceedings, Ser. B,* 63(8):595–616, Aug. 1, **1950.** 26 figs. 9 refs. **DWB**—The inversion that results when föhn winds blow out over the sea near Canterbury Bight has a pronounced effect on radio transmission. Meteorological factors and transmission measurements are analyzed. Some lapse rate and field strength contour charts are given. (*Same item as* 2.5–52, May 1951, *MAB.*) *Subject Headings:* **1. Radio transmission ducts 2. Superrefraction 3. South Island, New Zealand.**

8I–93 551.594.7

Parke, Nathan Grier, III, **Microwaves in an irregular atmosphere.** Contract AF19(122)-91 Interim Reports, No. 1–3, Sept. 30–July 15, **1950.** 3 pieces. tables, eqs., refs. (Third interim report has subtitle: **Scattering by discrete distributions.**) **DWB**—In the first phase of the project

survey of previous work on tropospheric propagation of microwaves was made. The author's heoretical work on Matrix optics was extended and adapted to the scattering problem for short raves. An approximation was developed for the quasi-stationary case. In the second phase, the lgebra was worked out for relating the scattering of microwaves to the conditions existing in a urbulent atmosphere. Using dipoles as the basic elements, general expressions are derived for the ower received from dipole distribution, and the results are applied to case of reception of radiation cattered by a cloud of fluctuating electric susceptibility. The formula $w(s,t) = (Vk^4/(4\pi R)^2)$ $\langle W_0\sigma(s,t)$, where W is the scattered power and σ is the Fourier transform of the space autocorrelation f the electric susceptibility, was obtained. In the last stage the problem of scattering by discrete istributions of scatterers was considered. Six models were analyzed, in which the scatterers were tatic, dielectric spheres. Then the problems of moving scatterers, and the theory tested against ne specific problem of falling rain. The spectrum of radiation returned by rain when observed ooking vertically upward is determined, illustrated and described. *Subject Headings:* **1. Microwave cattering 2. Raindrop size distribution.**—*From author's abstract.*

8I–94 551.594.7

Perlat, A., **Effet des conditions météorologiques sur la propagation des ondes radioélectriques fréquence elevée.** [Effect of meteorological conditions on the propagation of radioelectric waves f high frequency.] *Journal Scientifique de la Météorologie*, 2(8):101–107, Oct./Dec. **1950.** 3 figs. rench, English and Spanish summaries p. 101. **DWB**—Test conducted in 1948 and 1949 between aris and Clacton on Sea (Eng.) show that anomalous reception of 2 m radar signals depends on the resence of a subsidence inversion over the area and the absence of any fronts along the course. est reception (at distance of 400 km) occurs when pressure is above 1013 mb and dew point above °C. Surface observations and radiosonde data were analyzed for 52 cases during the year when ng-distance reception was possible. (*Same item as* 2.6–153, June 1951, *MAB.*) *Subject Headings:* **. Radio transmission ducts 2. Anomalous radio propagation.**—*M.R.*

8I–95 551.510.535:551.571:621.396.11

Phillips, W. Eric, **The permittivity of air at a wave-length of 10 centimeters.** *Institute of Radio ngineers, Proceedings*, 38(1):786–790, July **1950.** 5 figs., 3 tables, 16 refs. **DWB**—Observed alues of permittivity of moist air under various conditions of temperature, water vapor content nd pressure are in agreement with theoretical static values and confirm belief that water vapor is ery important in atmospheric refraction or anomalous propagation of centimeter-radio waves. Vavemeter and method of measurement described. Tables show results of measurement of dry air sea level and at reduced pressure, of saturated air and of moist air. Work done is preliminary to ng term program of correlating meteorological conditions with microwave propagation off the ast of Natal. (*Same item as* 2.10–61, Oct. 1951, *MAB.*) *Subject Headings:* **1. Microwave trans-ission 2. Water vapor 3. Natal, South Africa.**—*M.R.*

8I–96 551.594.7

Pickard, Greenleaf W. and Stetson, Harlan T., **Comparison of tropospheric reception at 44.1 mc nd at 92.1 mc, over the 167 mile path, Alpine, New Jersey, to Needham, Massachusetts, 1947–1948.** *ournal of Atmospheric and Terrestrial Physics*, 1(1):32–36, **1950.** 4 figs., 2 refs. Also condensed ersion in: *Institution of Radio Engineers, Proceedings*, 38(12):1450, Dec. **1950. DLC**—Daily and ourly field intensities of transmissions show close correlation with index of refraction of radio aves computed from pressure, temperature and humidity at Boston, Mass. Frequency distribution reception in decibels is analyzed. Transmission is mainly due to refraction in the lower atmos-here. (*Same item as* 3.2–201, Feb. 1952, *MAB.*) *Subject Heading:* **1. Radio transmission.**—*E.P.B.*

8I–97 621.396.029:551.594.7

Smith-Rose, R. L., **The speed of radio waves and its importance in some applications.** *Institute Radio Engineers, N. Y., Proceedings*, 38(1):16–20, Jan. **1950.** 2 tables, 16 refs. **DLC**—The resent knowledge of the subject is discussed and summarized. A table furnishes the measurements type of waves, frequency, transmission, mean value in km/s accuracy, and the names of the orkers. Influence of the refractive index upon speed of waves is considered. *Subject Headings:* **Radio wave speed 2. Refractive index.**—*W.N.*

8I–98 551.594.7:621.396.026

Straiton, A. W. and Smith, H. W., **Progress of microwave radio scintillations at wind speed on overwater path.** *Institute of Radio Engineers, N. Y., Proceedings*, 38(7):825–826, July **1950.** g., 2 tables, 3 refs. **DLC**—Brief report and results of a 2-way analysis of the experimental trans-ission of 3.2 cm wave over the 26 mi path in the Gulf of Mexico during June and July 1949 are ven here. It is indicated that the scintillations were rather due to regions of different electric

constant moving across the path, than to additional signals from scattering areas outside the duct. *Subject Headings:* **1. Propagation experiments 2. Radio wave scattering theories 3. Oceanic ducts 4. Gulf of Mexico.**—*W.N.*

8I–99 551.594.7

Stranz, Dietrich, **Meteorologie und Mikrowellenausbreitung.** [Meteorology and propagation of microwaves.] *Meteorologische Rundschau*, 3(9/10):199–202, Sept./Oct. **1950.** 2 figs., 2 tables, 20 refs., eqs. **DWB**—After a historical introduction, author applies laws of optics to calculations of paths of radio beams for various refractive indices and degrees of absorption. The dimensions of the factors are of the same order as those of small discontinuities in the troposphere. Finally, a reference is made to "radioclimatology." (*Same item as* 2.2–171, Feb. 1951, *MAB.*) *Subject Heading:* **1. Radio wave scattering theories.**—*C.E.P.B.*

8I–100 551.501.6:551.594.7

Swingle, Donald M., **Nomograms for the computation of tropospheric refractive index, its gradients and discontinuities.** Harvard Univ. Cruft Lab., Contract N5ori-76, Task Order No. 28, Technical Report No. 102, Feb. 25, **1950.** 15 leaves. 3 figs., table, 24 refs., 28 equations. **MH-BH** ---Index of refraction n of moist air is given by

$$(n-1)\times 10^6 = \frac{74'4}{T}\left(p + \frac{4973\,e}{T}\right)$$

valid for electromagnetic waves down to 1.5 cm. Three sets of nomograms are given, designed for use with radiosonde ascents: (1) for refractive index in terms of density of atmospheric gases and dew point, (2) for discontinuities due to discontinuities of air temperature and dew point and (3) for gradients of refractive index in terms of gradients of temperature and dew point. (*Same item as* 2D–197, April 1951, *MAB.*) *Subject Headings:* **1. Nomograms 2. Refractive index variations.** —*C.E.P.B.*

8I–101 551.510.52:621.396.11

Yerg, Donald G., **The importance of water vapor in microwave propagation at temperatures below freezing.** *American Meteorological Society, Bulletin*, 31(5):175–177, May **1950.** 5 figs., table, 2 refs., 4 eqs. **DWB**—Nomograms show contribution of vapor pressure to refractive index at various temperatures (0° to −40°C), and to dn/dh (slope of the index curve) for temperature inversions in a saturated atmosphere. Modified index-of-refraction curves computed by neglecting and then by including vapor pressure as obtained from radiosonde flights at Fairbanks and Bethel. Conclusion is that vapor pressure cannot be neglected at temperatures above −35°C. (*Same item as* 10–51, Oct. 1950, *MAB.*) *Subject Headings:* **1. Radio transmission ducts 2. Vapor pressure 3. Fairbanks, Alaska.**—*M.R.*

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8I–102 551.594.7:06 621.396:06

Baldinger, E. and Schaetti, N., **9. Generalversammlung der Union Radio-Scientifique Internationale (U.R.S.I.) in Zürich (vom 11.–22. September 1950).** [Ninth general meeting of the International Scientific Radio Union (U.R.S.I.) in Zurich (Sept. 11–22, 1950).] *Zeitschrift für angewandte Mathematik und Physik*, 2(3):212–214, May 15, **1951. DLC**—A brief report of the meeting including recommendations for further investigations to the following Commissions: II. Propagation in the troposphere (further investigation of influence of latitude, nature of ground and climate on refractive index, especially for short waves); III. Ionosphere and propagation of waves; IV., V. Radio noises of terrestrial origin and of extra-terrestrial origin. (*Same item as* 5.6–285, June 1954, *MAB.*) *Subject Headings:* **1. Radiocommunication 2. International Scientific Radio Union 3. Conferences.**—*C.E.P.B.*

8I–103 551.593.1:535.4

Birnbaum, George, **Fluctuations in the refractive index of the atmosphere at microwave frequencies.** *Physical Review*, 82(1):110–111, April **1951.** 2 figs., 6 refs., 3 eqs. **DLC**—Brief note on experimental observations as conducted with the aid of a refractometer developed and located at National Bureau of Standards, Wash., D. C. The difference in recording with one or both cavities of the instrument open to air is shown graphically. *Subject Heading:* **1. Refractive index variations.** —*W.N.*

8I–104 551.594.7:621.396

Booker, Henry George (*Cornell Univ.*), **Meteorological aspects of propagation problems.** (In: **Compendium of meteorology.** Boston, American Meteorological Society, **1951.** p. 1290–1296.

3 figs., 20 refs., 5 eqs.) **DWB**—The phenomenon of superrefraction or extra downward refraction in which the downward refraction of radio waves exceeds the curvature of the earth, as experienced at radar stations is described and the regions in which this phenomenon has been observed are listed. An explanation of the origin of superrefraction in terms of the temperature excess and of the humidity deficit of the appropriate air mass in relation to the earth's surface is presented. The problem of specifying accurately the temperature and humidity gradients and other meteorological data from generally available synoptic data and the meteorological factors responsible for these gradients are discussed. Some of the meteorological investigations made by R. A. Craig and H. G. Booker on the measurement of temperature and humidity at various heights and the explanation of their distribution by a theory of the modification in air mass by eddy diffusion, are summarized. (*Same item as* 4.8–4, Aug. 1953, *MAB.*) *Subject Headings:* **1. Superrefraction 2. Radio wave propagation 3. Radio transmission ducts 4. Compendium articles.**—*I.L.D.*

8I–105 551.594.7:621.396.029

Boyd, J. E. (*Ga. Inst. of Tech.*), **The effect of atmospheric conditions on the propagation characteristics of electromagnetic waves in the microwave region.** Georgia Institute of Technology. State Engineering Experiment Station, Contract W28-099-ac-175, Project 109-8, Technical Report, No. 4, Final Report on Project, June 30, **1951.** 91 p. diagr., graphs, 10 refs. **DWB**—During 1947, 1948 and 1949 the signal strength for optical and nonoptical links (at frequencies of 1310, 2860 and 9400 Mc) over highly varying and rough terrain were intensively studied, stressing the meteorological influence on microwave propagation, particularly the effects of ducts, inversions and turbulence. Data on refracting conditions were obtained by aircraft and balloon soundings and by radiosondes and modern electronic apparatus. Measurements up to 100 ft above the surface were taken with a meteorological tower sounding system. The valuable results are analyzed and discussed, concluding with the desirability of further intensive investigations of the important problem of the atmospheric structure within the first hundred feet above the earth's surface, and of the effect of irregular ground on signal stability. *Subject Headings:* **1. Propagation experiments 2. Radio-weather conditions.**—*W.N.*

8I–106 551.594.7

Brocks, Karl, **Probleme der "Radiometeorologie."** [Problems of radio-meteorology.] *Annalen der Meteorologie*, 4(1/6):78–86, **1951.** 2 figs., table, 17 refs., 4 eqs. Summaries in German and English p. 78. **DWB**—A discussion of the effect of the atmosphere on radio waves 1 cm to 10 m. The equations of the "relative beam-curvature" (negative gradient of refractive index times earth's radius) are set out and constants of pressure and vertical gradients of temperature and humidity tabulated. Other measures of refraction in use are defined. Diurnal variations at Quickborn are discussed. (*Same item as* 3.4–258, April 1952, *MAB.*) *Subject Headings:* **1. Radio-weather conditions 2. Refractive index computations 3. Quickborn, Germany.**—*C.E.P.B.*

8I–107 551.594.7:016:535.2

†Cornell Univ. School of Electrical Engineering, **Bibliography of reports on tropospheric propagation.** Contract AF 33(038)-1091, Final Report, Pt. 1, April 1, **1951.** Each section renumbered. **DLC**—A thoroughly annotated bibliography of 867 reports on 17 phases of troposphere radio propagation from numerous American, British, Australian, Canadian and New Zealand sources from 1940 to 1949. The only sources other than those from the English language that have been abstracted are those which have been translated by such agencies as CADO and NACA. The abstracts are thorough and contain essential information and theory. A detailed subject and author index is provided. The meteorological theory and instrumentation, effect of temperature and humidity inversions, hills, trees, storms, polarization, etc. are all given proper emphasis. The term "Radio climatology" is introduced here. (*Same item as* 4.7–226, July 1953, *MAB.*) *Subject Headings:* **1. Tropospheric propagation bibliographies 2. Radio wave propagation 3. Radio climatology.** —*M.R.*

8I–108 551.594.7(09):621.396.029.6

*Cornell Univ. School of Electrical Engineering, **Summary report, air-to-air and air-to-ground electromagnetic propagation.** Contract AF33(038)-1091, Final Report, Pt. 2, June 1, **1951.** 109 p. tables, figs., eqs. **DWB**—The present state of knowledge on propagation of electromagnetic waves above 30 Mc/s is reviewed and summarized under the following headings: 1) An evaluation of radio wave propagation problems with emphasis on air-to-air and air-to-ground transmission; 2) Standard and non-standard atmosphere propagation—pure theory; 3) Propagation experiments; 4) Meteorological theory, experiment and equipment; 5) Radar forecasting; 6) Absorption and scattering; 7) Dielectric constant and loss factor; 8) Reflection coefficient; 9) Horizontal and vertical polarization; 10) Effects of hills, trees and other obstacles; 11) Air-to-air and air-to-ground propagation.

References to earlier work and definitions of the topics are included. *Subject Headings:* **1. Radio meteorology 2. Microwave propagation 3. Tropospheric propagation 4. Ionospheric propagation.** —*W.N.*

8I–109 551.594.7

*Cornell Univ. School of Electrical Engineering, **Investigation of air-to-air and air-to-ground experimental data.** Contract AF33(038)-1091, Final Report, Pt. 3, Dec. 10, **1951.** 182 p. numerous figs., tables, eqs. **DWB**—Attempts to obtain the true shape of the refractive index profile from a model of a horizontally stratified atmosphere and from radio data yield valuable information on characteristics without solving the problem. A wave structure is suggested and a theory of the elevated layers predicts satisfactorily the radio holes and to some degree the interference regions by means of statistical analysis. A method for computing the field strength in a standard atmosphere for communication (above 30 Mc/s) between two aircraft at the same altitude over land is presented. It is suggested that one plane should stay below 5000 ft because of the radio holes (24 of 27 runs above 5000 ft contained radio holes). *Subject Headings:* **1. Radio communication 2. Refractive index profiles 3. Radio holes 4. Standard atmosphere.**—*W.N.*

8I–110 551.594.7:621.396.029.6

*Cornell Univ. School of Electrical Engineering, **Air-to-air radio wave propagation data.** Contract AF33(038)-1091, Final Report, Pt. 4, Dec. 10, **1951.** 139 p. numerous graphs, 2 figs. **DWB**—The individual records and data of 22 flights are presented. The meteorological conditions for each flight are given, and a brief description of radio and meteorological instrumentation is included. The field strength (in most cases) was plotted as a function of distance, including the distance between two aircraft taking off from Wright-Patterson Air Force Base, meeting and then separating for a determined flight-distance at equal speed to keep the center point fixed at a constant altitude. The theoretical curves presented, involved geometrical optics to a stratified atmosphere. Reflection coefficients were compared to theoretical values for each flight. The use of the form for analysis and estimation of the refractive index is demonstrated. The results are summarized in Final Report, Pt. III (8I–109). *Subject Headings:* **1. Radio meteorology 2. Microwave propagation 3. Refractive index 4. Airborne instruments.**—*W.N.*

8I–111 551.501.81:551.590.25

Feinstein, J., **The interpretation of radar waves from meteor trails.** *Journal of Geophysical Research*, 56(1):37–51, March, **1951.** 4 figs., table, 9 refs., 7 eqs. **DLC**—Electromagnetic-wave theory is applied to various cylindrically symmetric distributions of electron density to ascertain the dependence of reflected radio signals upon the system parameters. Results are expressed in terms of the average effective dielectric constant, the circumference/wave-length ratio of the cylinder, and the incident wave polarization. Two models have been mainly considered—a linear radial variation of electron density, and a constant density distribution. The general properties and dependences of the echoes are summarized for each major region of trail parameters, and the transitional characteristics are indicated. A qualitative comparison of these results with published observational data leads to a new picture of the trail decay period. *Subject Headings:* **1. Radar echoes from meteor trails 2. Radio wave scattering theories.**—*Author's abstract.*

8I–112 551.594.7:535.32

Feinstein, J., **Tropospheric propagation beyond the horizon.** *Journal of Applied Physics*, 22(10):1292–1293, Oct. **1951.** fig., 5 refs., eq. **DWB**—Since the atmosphere possesses a gradient of refractive index, a partial reflection of wave energy is delivered beyond the horizon of the transmitter. To estimate the magnitude of the field produced by that reflection, from a hybrid ray and wave theory, is the purpose of this paper. (*Same item as* 4.1–272, Jan. 1953, *MAB.*) *Subject Headings:* **1. Tropospheric reflection 2. Radio wave propagation 3. Radio transmission 4. Refractive index.**—*W.N.*

8I–113 551.510.5:621.11:519.2

Friedman, Bernard, **The dipole field in an inhomogeneous atmosphere.** New York Univ. Mathematics Research Group, Contract AF 19(122)-42, Research Report No. EM-28, March **1951.** 56 p. 16 refs., 96 eqs. Mimeo. **DWB**—A theoretical study of microwave propagation around the earth in a stratified atmosphere. At first several approaches to a solution are reviewed. The method used by Watson, Rydbeck, Van Der Pol and Bremmer has been extended to account for the general theory. The problem is that of finding the eigenvalues of an ordinary differential equation. The case of a uniform, a nonuniform atmosphere and the connection with the "Flat Earth" theory of Furry, Pekeris and others is developed. (*Same item as* 3.2–60, Feb. 1952, *MAB.*) *Subject Headings:* **1. Dipole field 2. Microwave propagation 3. Mathematical techniques.**—*M.R.*

8I–114 551.594.7:621.396.11

Friedman, Bernard, **Propagation in a non-homogeneous atmosphere.** *Pure and Applied Mathematics*, 4(2/3):317–350, Aug. **1951.** 3 figs., 16 refs., 96 eqs. **DWB**—Two previous approaches to the problem of microwave propagation around the earth (that of WATSON, RYDBECK and others, and that of PRYCE, BOOKER, FURRY and PEKERIS) are reviewed. In this substantial theoretical paper, a third fundamental assumption is used as an approach. Starting with MAXWELL's equations, the theory is developed for propagation in an inhomogeneous atmosphere where the dielectric constant is radially stratified. This allows treatment for a uniform and a nonuniform atmosphere, and results compare favorably with those obtained for a "flat earth" by the W.K.B. method, except where large distances exist between transmitter and receiver. Finally, the theory is applied to an atmosphere containing a duct, and a comparison made between the previous theory based on a magnetic dipole, and the corresponding equations for an electric dipole. (*Same item as* 4.7–227, July 1953, *MAB.*) *Subject Headings:* **1. Microwave propagation 2. Radio transmission ducts.**—*M.R.*

8I–115 551.594.7:621.396.11

†Gerks, Irvin H., **Propagation at 412 megacycles from a high-power transmitter.** *Institute of Radio Engineers, N. Y., Proceedings*, 39(11):1374–1382, Nov. **1951.** 14 figs., table, 17 refs., eq. **DLC**—During the summer of 1948 and fall, winter and spring of 1949–1950 measurements taken over rolling midwestern terrain (about 100 mi distance) indicate: (1) the existence of pronounced nocturnal superrefraction during summer and (2) of persistent scattering by atmospheric turbulence near the surface in all seasons. Graphs show the effect of distance, terrain, antenna height and time on field strength. Finally, the significance of the results in relation to electromagnetic wave communication is indicated. *Subject Headings:* **1. Microwave propagation 2. Turbulence 3. Radio meteorology.**—*W.N.*

8I–116 551.594.7:016

†Germany. Deutscher Wetterdienst in der US-Zone. Wetterdienstbibliothek, **Literatur-Ausstellung über Fragen auf dem Gebiet der Ausbreitung elektrischer Wellen vom Standpunkt der Meteorologie aus.** [Presentation of literature on problems in the field of electrical wave propagation from a meteorological point of view.] [**1951?**] 3 p. Mimeo. **DWB**—Four brief bibliographies are included, covering the following subjects applicable to the general subject of electromagnetic propagation: 1) The influence of the atmosphere on electric waves (17 items); 2) Thunderstorms (13 items); 3) Temperature and humidity in the lowest kilometer of the atmosphere (16 items); and 4) Pertinent German works on various fields of meteorology and forestry (10 items). (*Same item as* 4.4–277, April 1953, *MAB.*) *Subject Headings:* **1. Tropospheric propagation bibliographies 2. Electromagnetic waves 3. Germany.**—*M.R.*

8I–117 551.594.7:551.588.3

Gough, M. V., **Propagazione delle onde metriche (VHF) e decimetriche (UHF) entro il campo ottico.** [Propagation of meter (VHF) waves and decimeter (UHF) waves within the optical range.] *Marconi*, Rome, 2(3/4):21–32, July/Dec., **1951.** **DLC**—Ground reflection and its dominant influence on VHF and UHF propagation in the optical range is treated in some detail here. Other influencing factors such as atmospheric refraction, ionospheric and tropospheric reflections and diffraction are noted briefly. *Subject Headings:* **1. Microwave propagation 2. Topographic influences.**—*W.N.*

8I–118 551.594.7

Hines, C. O., **Wave packets, the Poynting vector, and energy flow, Pt. 1, Non-dissipative (anisotropic) homogeneous media. Pt. 2, Group propagation through dissipative isotropic media. Pt. 3, Packet propagation through dissipative anisotropic media.** *Journal of Geophysical Research*, 56(1,2): 63–72; 197–220, March, June, **1951.** 15 refs., 131 eqs. **DWB**—An attempt to correlate the results of electromagnetic propagation energy velocities obtained by the wave packet and the POYNTING vector by the energy density does not equal the speed obtained by the packet method. The first paper deals with nondissipative method in which the effective permittivity matrix is Hermitian. When plane homogeneous waves are propagated through a homogeneous, nonabsorbing media, agreement is good for direction in which energy flows. In the second paper, the expression for velocity of a wave packet or group speed in a dissipative isotropic medium was found to be $U = c/(dkn_1/dk)$ where n_1 is the real part of the refractive index at frequency $kc/2\pi$. Expressions are also obtained which apply to transmissions of pulses through slabs of material. In the third paper formulas are proposed for expressing the velocity of a packet in an anisotropic dissipative medium. One expression is given for homogeneous waves and one for inhomogeneous waves. In the case of nondissipative media, the two are shown to be equal. (*Same item as* 4.5–239, May 1953, *MAB.*) *Subject Headings:* **1. Electromagnetic wave propagation 2. Radio wave propagation.**—*M.R.*

8I–119 551.594.7:551.510.52(02)

Kerr, Donald E. (*ed.*), **Propagation of short radio waves.** 1st ed. Prepared under the supervision of the Office of the Scientific Research and Development, National Defense Research Committee. N. Y., McGraw-Hill, **1951.** 728 p. 299 figs. (*Massachusetts Institute of Technology, Radiation Laboratory Series*, No. 13.) **DLC**—The book discusses and treats radio meteorology with many experiments of correlating radio-meteorological patterns, and will be found handy as a reference on tropospheric propagation. The chapters are: Elements of the problem, Theory of propagation in a horizontally stratified atmosphere, Meteorology of the refraction problem, Experimental studies of refraction, Reflections from the earth's surface, Radar targets and echoes and Meteorological echoes and atmospheric attenuation. *Subject Headings:* **1. Tropospheric propagation 2. Textbooks.**—*W.N.*

8I–120 551.594.7:621.396

Knighting, E., **Some meteorological aspects of radio duct formation.** *Physical Society of London, Proceedings, Sec. B*, 64(373):21–30, Jan. **1951. DLC**—Theoretical discussion of three problems of meteorological interest concerning formation of radio ducts in the atmosphere, which occurs when variation of height of modified refractive index obeys certain conditions: 1) considerations of growth rate of ducts over sea, 2) duct formation during nocturnal cooling and 3) duct widths associated with power law profile of modified refractive index. *Subject Heading:* **1. Radio transmission ducts.**—*Author's abstract.*

8I–121 551.594.7:621.396

§†*New Zealand. Dept. of Scientific and Industrial Research, **Report of the factual data from the Canterbury Project, A radio-meteorological investigation in the South Island of New Zealand.** London, pub. by the Dept., **1951.** 3 V. (857+283+187 p.). figs., tables, graphs, refs. V. 2–3 oversize. **DWB**—These three large scientific volumes comprise the final report, including all of the data, charts and analyses of a joint scientific investigation conducted between Sept. 1946 and Dec. 1947 by the Dept. of Scientific and Industrial Research of the United Kingdom and of New Zealand. The "Canterbury Project" was planned in 1944 to provide information on the formation and behavior of low level atmospheric ducts caused by advection of warm dry continental air over the neighboring sea. An area in Canterbury Province of South Island, New Zealand was considered the most suitable. Vol. 1, **Descriptive and numerical data,** contains an analysis of all of the meteorological and radio data collected during this period and all of the detailed surface, upper air, synoptic and oceanographic data for the entire area around New Zealand. Airplane, radar, balloon, radiosonde and ship observations were used intensively and extensively. Each separate situation is described and analyzed. Surface (coded) synoptic observations are given for 00, 03, 06, 09, 12, 15 and 18 h for a score of stations. The observational, operational and theoretical considerations are also treated at great length and in detail. Vol. 2, **Meteorological data,** consists of a large "atlas" type presentation of graphs and charts prepared from the meteorological data collected during this survey. A detailed topographical map of the region and a cross section showing the relief in relation to observation stations is followed by detailed isopleth and sounding diagrams of potential temperature, specific humidity, temperature and upper air winds for levels from the sea level to 2000 ft height. Actual anemograph traces for the 50 ft level are reproduced for several stations for each of the 50 or so situations studied. Synoptic charts are presented for 1200 h local time for the Australasian region for all of the periods when data were obtained. Isopleth cross sections of potential temperature and specific humidity are given in great detail for a range of 25 mi of land and 120 mi at sea (to 1000 ft). Soundings are given for both land and sea. Vol. 3, **Radio-wave propagation data,** also consists of large detailed graphs and isopleth cross sections of modified refractive index, height gain curves, etc., from aircraft and ship soundings from 0 to 1000 or 2000 ft height. About 50 separate situations are thoroughly analyzed in this fashion. (*Same item as* 4.3–11, March 1953, *MAB.*) *Subject Headings:* **1. Radiometeorology investigations 2. Radio wave propagation 3. Tropospheric propagation 4. Radio transmission ducts 5. Canterbury Project 6. South Island, New Zealand. I. Great Britain. Dept. of Scientific and Industrial Research.**—*M.R.*

8I–122 551.593.1:551.501.7:551.571

*Overcash, Frank J. (*Aircraft Radiation Lab., Wright Air Dev. Center*), **Index of refraction measurement with an airplane psychrograph.** *U. S. Air Force, AF Technical Report*, No. 6621, Aug. **1951.** 38 p. 33 figs., 10 refs. **DWB**—An airplane psychrograph was used by the Aircraft Radiation Laboratory of Wright Air Development Center to obtain accurately the atmospheric index of refraction up to 10,000 ft in the Dayton, Ohio, area. Complete details of its use are given, with curves of experimental results. This instrument makes a continuous recording of the fine detail of the wet bulb and dry bulb temperature above freezing, which is used with pressure to calculate index of refraction. These data show that the index profile follows closely the wet bulb temperature profile in the Dayton, Ohio, area in the summer months. Index lapse rates greater

than $30(n-1)10^6$ units per 100 ft were recorded at 7000 ft. Actual index curves that conform approximately to what has been considered the standard were found to be the exception rather than the rule. (*Same item as* 7.7–254, July 1956, *MAB.*) *Subject Headings:* **1. Refractive index 2. Airplane psychrographs.**—*Author's abstract.*

8I–123 551.594.7:551.574.1

Parke, Nathan Grier, III, **Microwaves in an irregular atmosphere.** Contract AF19(122)-91, Fourth and Final Report, July 16, 1950–June 1, 1951. Concord, Massachusetts, June **1951.** 53 p. eqs. **DWB**—The method of computing statistically the Fourier transform for the audio frequency spectrum in a turbulent cloud or rain field, is outlined and the theory developed in detail. The aspects covered include a resumé of the Random walk problem and its application to the second distribution from which many different kinds of spectra are produced. The MARKOFF method as presented by CHANDRASEKHAR is examined and its application tested according to two interpretations. Pulse volume, terminal velocity distribution, drop size distribution, have been taken into account. Also, the case of negligible fall velocity is considered. *Subject Headings:* **1. Microwave attenuation 2. Raindrop size distribution 3. Random Walk Problem 4. Markoff method. I. Chandrasekhar, S.**—*M.R.*

8I–124 551.594.7:621.396.8

Perers, Olaf F.; Stjernberg, Bo. K. E., and Forsgren, K. H., **Microwave propagation in the optical range.** *Göteborg, Sweden. Chalmers Tekniska Högskola, Handelingar*, No. 108, **1951.** 19 p. graphs, photos, refs. Price: Kroner 3–. **DWB**—In 1946 when these propagation tests began in the vicinity of Göteborg, Sweden, access to reports on similar works by foreign scientists was not possible. The results presented are nevertheless valuable for studying the influence of local weather and consist of: transmission field strength, attenuation, refraction, fading and diurnal variation of 10, 3, and 1 cm wave lengths. Equipment, sites of installations and records are shown in photographs. (*Same item as* 3.9–238, Sept. 1952, *MAB.*) *Subject Headings:* **1. Microwave propagation 2. Microwave research 3. Göteborg, Sweden. I. Göteborg, Sweden. Chalmers Tekniska Högskola. Research Laboratory of Electronics.**—*W.N.*

8I–125 551.594.7:621.396.11

Phillips, W. Eric; Ashwell, P. C. and Browne, L. C. (*Univ. of Natal, Durban*), **Atmospheric super-refraction and the anomalous propagation of radio waves off the coast of Natal.** *South African Journal of Science*, 48(5):163–166, Dec. **1951.** 2 figs., 7 refs. **DWB**—Correlated meteorological observations with microwave phenomena on the Natal Coast of Wentworth and Durban, showed that superrefraction is present during the autumn and winter months. Some ducts were transitory. The $K-H$ layer plays no role in such propagation. Some data are given. (*Same item as* 4.5–241, May 1953, *MAB.*) *Subject Headings:* **1. Atmospheric refraction 2. Microwave propagation 3. Radio wave propagation 4. Natal, South Africa.**—*W.N.*

8I–126 551.510.52:621.396

Schachenmeier, Richard, **Untersuchungen über den Einfluss der Troposphäre auf die Ausbreitung ultrakurzer Wellen.** [Investigations of the influence of troposphere on propagation of ultra-short waves.] *Archiv der Elektrischen Ubertragung*, 5(1):1–9, Jan. **1951.** 9 figs., 8 refs., 46 eqs. **DLC**—A method for reliable calculation of field strength is demonstrated. The method is based on the physical principles of propagation: (1) the combined effects of atmospheric refraction and (2) diffraction due to the curvature of the earth. Values from meteorological observations are compared and found in satisfactory agreement with measured field strength at meter and decimeter wavelengths for different land and sea paths. Propagation within and beyond the optical range is treated separately. *Subject Headings:* **1. Microwave propagation 2. Tropospheric propagation.** —*W.N.*

8I–127 551.510.5:621.396.11

Slusser, E. A., **Predicting performance of UHF and SHF systems.** *Electronics*, Albany, 24(6): 116–121, June **1951.** 14 figs., 2 tables, 18 eqs. **DWB**—Topographic and atmospheric conditions affecting propagation of ultra high frequency waves are discussed and illustrated. Curves illustrate effect of rain and fog on SHF absorption. (*Same item as* 3.2–63, Feb. 1952, *MAB.*) *Subject Heading:* **1. Microwave transmission.**—*M.R.*

8I–128 551.594.6

Stoyko, Anna, **Sur la variation de la vitesse de propagation des ondes radioélectriques.** [Variation of the velocity of propagation of radioelectric waves.] *Académie des Sciences, Paris, Comptes Rendus*, 232(21):1916–1918, May 21, **1951.** table, 2 refs. **DWB**—The author shows that the apparent speed of the propagation of radioelectric signals is normally much less than the speed of

echoes around the earth and this speed is variable. (*Same item as* 3.2–202, Feb. 1952, *MAB.*) *Subject Headings:* **1. Radio wave propagation 2. Radio echoes.**—*I.L.D.*

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8I–129 551.594.7:621.396.11

Abild, Bruno, **Überreichweiten bei ultrakurzen Wellen und ihre meteorologischen Ursachen.** [Extended ranges of ultrashort waves and their meteorological causes.] *Germany. Deutscher Wetterdienst in the US-Zone, Berichte*, No. 35:227–228, **1952.** Also issued as *Hamburg. Nordwestdeutscher Rundfunk, Technische Hausmitteilungen*, 4:4–11, **1952.** 20 figs., 10 refs. **DWB**—Experimental transmissions of 3 m waves were carried out by the Nordwestdeutscher Rundfunk (1951) over a 150 km overland path. The receiving site (200 m transmission height) was about 100 km beyond the normal horizon. The field strength observations agreed well with the 6-hourly radiosonde and surface observations. The cause of the extended range (beyond the horizon) is explained by heavy inversions, but the obvious close correlation between propagation and the meteorological factors as a function has not been explained. A statistical evaluation might be possible, hence charts based on meteorological observations will be made in an attempt to forecast time of the day and the month when the phenomenon might occur. (*Same item as* 4.4–276, April 1953, *MAB.*) *Subject Headings:* **1. Microwave propagation 2. Inversions 3. Germany.**—*W.N.*

8I–130 551.594.7:621.396(435)

Abild, Bruno; Wensien, H.; Arnold, E. and Schikorski, W. (*Aerologische Station, Flensburg, N.W. Germany*), **Über die Ausbreitung ultrakurzer Wellen jenseits des Horizontes unter besonderer Berücksichtigung der meteorologischen Einwirkungen.** [On the propagation of ultrashort waves beyond the horizon with special consideration of meteorological influences.] *Hamburg. Nordwestdeutscher Rundfunk, Technische Hausmitteilungen*, 4(5/6):85–100, May/June **1952.** 25 figs., 7 tables, 7 refs., 43 eqs. Abstracted from reprint. **DWB**—After a detailed theoretical analysis of ultrashortwave propagation, in which the effect of various conditions in the deflection and the interference zones is investigated and illustrated by numerous diagrams, tables and graphs, the authors report field intensity measurements conducted in N.W. Germany. General conclusions are deduced from observed high field intensities and corresponding synoptic situations. Data on the correlation between field intensities and height and thickness of inversions, pressure and temp. are presented. Seasonal variations of inversions, of anomalous field intensities, etc. are shown in tables and graphs. The authors conclude that both ground-level inversions and those above 3000 m increase field intensities. A few situations in which the effect of inversions was particularly noticeable are described. (*Same item as* 4.11–284, Nov. 1953, *MAB.*) *Subject Headings:* **1. Ultrashort wave propagation 2. Inversions 3. Correlations 4. Northwest Germany.**—*G.T.*

8I–131 551.594.7

Beckman, B., **Die ionosphärische und troposphärische Steuerung der Funkwellenausbreiten.** [Ionospheric and tropospheric steering of wireless broadcasts.] *Zeitschrift für Meteorologie*, 6(4): 112–117, April, **1952.** 4 figs., 10 refs., 8 eqs. **DWB**—The transmitting frequency (UFB) of the space wave from a broadcasting station lies between the limits of reflection and damping in the ionosphere. Its distribution, diurnal and annual variations are illustrated and discussed. Refraction in the troposphere (normally at about 8000 m) plays an important part in extending the range only of ultra-short and decimeter waves in inversions. It is much less regular than ionospheric steering. The index of refraction, which depends on moisture content, is small and only becomes effective with wave inclination under 1°. (*Same item as* 3.9–235, Sept. 1952, *MAB.*) *Subject Heading:* **1. Radio wave propagation.**—*C.E.P.B.*

8I–132 551.501.8:06

Bemis, Allan C. (*M.I.T.*), **Census of radar-weather projects.** *Illinois. State Water Survey Div., Bulletin*, No. 41:193–197, **1952. DWB**—The U. S., British and Australian research projects on microwave propagation and studies of clouds or storms by use of radar are listed under two main headings: 1) Weather-radar research projects—of which 5 are on microwave propagation, 4 on general weather radar, 9 on cloud physics, hydrology and storm detection; and 2) Weather-radar development projects—of which 9 are on instrumentation and 5 on application. Details of each project (supporting agency, purpose and equipment) are also given. (*Same item as* 4.10–31, Oct. 1953, *MAB.*) *Subject Headings:* **1. Radar weather projects 2. Microwave propagation studies.** —*W.N.*

8I–133 551.594.7

Christall, F. I. and Cubitt, J. D., **Unusual radar performance, Red Sea.** *Marine Observer*, 22(55):14–15, Jan. **1952. DWB**—March 1, 1951, pronounced echoes at 50,000–60,000 yd separated

by a gap from normal echoes at 30,000 yd. Example of superrefraction. (*Same item as* 3.9–236, Sept. 1952, *MAB.*) *Subject Headings:* **1. Superrefraction 2. Radar echoes 3. Red Sea.**—*C.E.P.B.*

8I–134 551.594.7

Cornell Univ. School of Electrical Engineering, **Investigation of air-to-air and air-to-ground electromagnetic propagation.** Contract AF33(038)-1091, Interim Engineering Report, No. 15, June 10, **1952.** 23 p. 2 figs., 2 tables, eqs. **DWB**—Various forms of the correlation functions were discussed, the importance of which were demonstrated by deriving their corresponding scattering coefficients. The theoretical results showed that if the average signal power and noise power are constant, the correlation functions are related by a constant factor. The small value of the signal to noise ratio must be attributed to "noise." Some results of variation of scale intensity with height were given. *Subject Heading:* **1. Microwave propagation.**—*W.N.*

8I–135 551.594.7:551.510.52:621.396.9

Crain, C. M. and Gerhardt, J. R., **Measurements of the parameters involved in the theory of radio scattering in the troposphere.** *Institute of Radio Engineers, N. Y., Proceedings,* 40(1):50–54, Jan. **1952.** 5 figs., table, 6 refs., 2 eqs. **DLC**—Preliminary measures of the scale and the intensity of turbulence were obtained by direct measurements of the variation of the index of refraction and the associated temperature fluctuations from 10 in. to 50 ft above the ground. The observations have been carried out by the Electrical Engineering Research Laboratory of the University of Texas since 1948–49. It is shown that the instantaneous patterns of temperature, moisture or refractive index generally have a magnitude significantly greater than zero. Observations to 300 ft above the ground will be made. (*Same item as* 4.1–271, Jan. 1953, *MAB.*) *Subject Headings:* **1. Radio wave scattering 2. Tropospheric propagation 3. Refractive index 4. Temperature effects. I. Texas. Univ. Electrical Engineering Research Laboratory.**—*W.N.*

8I–136 551.594.7:621.396

Crawford, A. B. and Jakes, W. C., Jr., **Selective fading of microwaves.** *Bell System Technical Journal,* 31(1):68–90, Jan. **1952.** 14 figs., table, 4 refs. **DLC**—The results of an extended survey of microwave propagation over two line-of-sight paths in New Jersey are described. Angle-of-arrival measurements at 1.25 cm wave length and selective fading observations in a 450 Mc frequency band centered at 2950 Mc show that the severe fading can be explained in terms of multiple-path transmission. A computer of the analogue type was built to simulate the more complicated selective fading patterns. *Subject Headings:* **1. Microwave propagation 2. Radio fading.**—*Authors' abstract.*

8I–137 535.4:551.594.7:551.593.1

Gast, E.; Essen, L. and Froome, K. D., **The refractive indices and dielectric constants of air and its principal constituents at 24,000 Mc/s.** *Archiv der Elektrischen Übertragung,* 6(12):532–534, Dec. **1952.** fig., 2 tables. **DLC**—The oscillator, the accuracy of which is comparative to that of the optical range, is briefly described and outlined in a diagram. Results of measurements of air, nitrogen, osygen and argon free from carbon dioxide are presented in tables, featuring a number of results at various frequencies by other workers. For the refractive index of humid air under different atmospheric conditions formulas were deduced that can be reduced to normal atmospheric condition by:

$$(n_{t,p}-1)\cdot 10^6 = \frac{103{,}49}{T}\cdot p_1 + \frac{177{,}4}{T}\cdot p_2 + \frac{86{,}26\cdot p_3}{T}\left(1+\frac{57{,}48}{T}\right),$$

where p_1, p_2 and p_3 stand for the part pressure of dry air, carbon dioxide and water vapor; t = the temperature in °C; $T = t + 273$ the absolute temperature. The value for the dipole moment of the water vapor molecule was deduced as $1.839 \pm 0.002 \cdot 10^{18}$. *Subject Headings:* **1. Refractive index 2. Microwave refraction.**—*W.N.*

8I–138 551.594.7:621.396

Hay, H. G. and Unwin, R. S., **Tropospheric wave propagation in a duct of nonuniform height.** *Physical Society of London, Proceedings Ser. B,* 65(12):981–989, Dec. 1, **1952.** 3 figs., 4 refs., 26 eqs. **DWB**—The simple mode theory of tropospheric refraction (H. G. Booker and W. Walkinshaw, 1947) is extended to cover situations where refractive index profile varies, e.g., with distance offshore. The expression (22) for field strength in decibel form is applied to experimental data on radio ducts off New Zealand, duct width increasing from 100 ft near coast to 350 ft at 55 km, and gave values of field strength of the right order at long ranges. A more general expression for field strength is also given (16). (*Same item as* 4.5–238 May 1953, *MAB.*) *Subject Headings:* **1. Radio transmission ducts 2. New Zealand.**—*C.E.P.B.*

8I–139 551.594.7:551.521.1:538.3(02)

†Hund, August, **Short-wave radiation phenomena.** New York, McGraw-Hill, **1952.** 2 vol. 1382 p. 394 figs., 97 tables, 1009 eqs., bibliog. p. 1288–1301. **DLC** (QC661.H83)—This valuable work covers theoretical and experimental contributions from the discovery of the electromagnetic wave to their applications in radio communication and in guided missiles. The nine chapters are as follows Ch. 1, Fundamental concepts and relations of currents and electromagnetic fields; 2, Space electromagnetic fields of elementary electric and magnetic dipoles; 3, Fundamental methods used in electromagnetic theory; 4, Propagation characteristics; 5, Transmission lines and radiation; 6, Unobstructed space radiation; 7, Space radiation in the presence of electromagnetic obstruction; 8, Electromagnetic diffraction and 9, Wave guides and cavities. Cross references are provided. The last three chapters deal particularly with radio-meteorology. The appendix provides a list of the symbols used and an extensive bibliography. (*Same item as* 4.4–278, April 1953, *MAB.*) *Subject Headings:* **1. Short wave radiation 2. Electromagnetic waves 3. Radio meteorology.**—*W.N.*

8I–140 551.510.535:621.396

Kelso, John M., **Radio-wave propagation at oblique incidence including the Lorentz polarization term.** *Institute of Radio Engineers, New York, Proceedings,* 40(1):87–97, Jan. **1952.** 17 figs., 11 refs., 35 eqs. **DLC**—An extension of author's previous work on the vertical incidence absorption of a radio wave in a deviating layer. As in the first paper, the present paper is also based on approximations given by Hacke. Following quantities are studied: the true height of reflection, ray path, reflection coefficient, range in the ionosphere and the group path without introducing earth's effect. Assuming the earth to be first plane and then curved, the author considers analytically: the ground range, the reflection coefficient as a function of ground range and the group path. Some limitations and restrictions applied are given. (*Same item as* 3.10–104, Oct. 1952, *MAB.*) *Subject Headings:* **1. Radio wave propagation 2. Microwave transmission 3. Ionosphere 4. Microwave research.**—*W.N.*

8I–141 551.510.52(569.4):621.396.9

Neumann, J., **Diurnal variation of the subsidence inversion and associated radio wave propagation phenomena over the coastal area of Israel.** *Israel. Meteorological Service, Ser. A, Meteorological Notes,* No. 6, **1952.** 16 p. 5 figs., table, 10 refs., 20 eqs. **MH-BH**—Mean height, pressure, temperature and humidity of base and top subsidence inversion at Lydda Airport at 1, 7, 13 and 19 h were found for July 1945 and diurnal variations computed. Inversion base-top varied from 678–1101 m at 7 h to 486–781 m at 19 h and is probably lowest at 17 h. Main rises (1–7 h) and falls (13–17 h) are associated with convergent land and divergent sea breezes. The modified refractive index profiles for radio waves are calculated; the lowest level of the elevated duct and greatest hydrolapse account for the observed optimum propagation in the evening. (*Same item as* 4.5–83 May 1953, *MAB.*) *Subject Headings:* **9. Radio transmission ducts 2. Temperature inversions 3. Humidity lapse rate 4. Israel.**—*C.E.P.B.*

8I–142 551.594.7:621.396

Northover, F. H., **The anomalous propagation of radio waves in the 1–10 metre band.** *Journal of Atmospheric and Terrestrial Physics,* 2(2):106–129, **1952.** fig., 12 refs., 109 eqs. **DWB**—Anomalous propagation of meter waves is discussed mathematically and results applied to an observed dry bulb inversion from 41–51°F at 3900 ft above Cardington (Eng.). Wet bulb 40°F. It is found that such an upper inversion, sharp enough to act as a discontinuity, can cause considerable anomalous propagation in waves of $3\frac{1}{2}$ and 7 m. (*Same item as* 3.9–237, Sept. 1952, *MAB.*) *Subject Headings:* **1. Radio transmission ducts 2. Anomalous radio propagation.**—*C.E.P.B.*

8I–143 551.594.9:551.515

Reiter, Reinhold, **Beziehungen zwischen Infra-langwellenstörungen und meteorologischen Erscheinungen bzw. Vorgängen.** [Relations between infra-long-wave disturbances and meteorological phenomena or processes.] *Meteorologische Rundschau,* 5(7/8):138–140, July/Aug. **1952.** 5 figs., 4 refs. **DWB**—Records of disturbances in 10–50 and 5–12 kHz, within about 1000 km of Munich are tabulated 4 half-days before to 4 half-days after days of various meteorological events. Cold fronts and magnetic disturbances gave a maximum frequency, warm fronts and föhn a minimum. The annual variation of disturbances is discussed. (*Same item as* 4.4–280, April 1953, *MAB.*) *Subject Heading:* **1. Radio disturbances.**—*C.E.P.B.*

8I–144 551.510.52:621.396.8 551.594.7

Schulkin, M., **Average radio-ray refraction in the lower atmosphere.** *Institute of Radio Engineers, New York, Proceedings,* 40(5):554–561, May **1952.** 7 figs., 2 tables. **DLC**—Presents empirical results (accompanied by many useful curves) of computations for a range of climatological conditions in North America, of the bending of rays that pass entirely through the atmosphere and

arrive or depart tangentially to the earth's surface. Ninety per cent of the ray bending occurs in the lowest 10 km of the atmosphere. The results are compared with the standard refraction approximation and it is found that although in the average case there is fairly good agreement, the deviation from the true refraction is large both as a function of altitude and of geographical location. Most of the curves are based on data for Washington, D. C. (*Same item as* 4.7–231, July 1953, *MAB.*) *Subject Headings:* **1. Microwave propagation 2. Tropospheric refraction 3. Microwave refraction 4. Washington, D. C. 5. North America.**—*W.N.*

8I–145 551.594.7:551.515

Spencer, C. W., **Radio-wave propagation at 89 Mc/sec in relation to synoptic conditions.** *Meteorological Magazine*, London, 81(961):206–212, July **1952.** fig., 4 tables, 5 refs. **DWB**—Superrefraction of 3.4 m waves over a distance of 257 km was recorded daily at Slough, Eng. It was compared with isobaric curvature; greatest relative frequency with cols, easterly and southerly types, least with cyclonic and northerly types. Nearly always with elevated (below 700 mb) or less often surface inversions, especially 950–900 mb. (*Same item as* 4.4–279, April 1953, *MAB.*) *Subject Headings:* **1. Superrefraction 2. Atmospheric disturbances 3. Slough, Eng.**—*C.E.P.B.*

8I–146 535.4:551.593.1:551.524.4

U. S. Air Force, Third Air Weather Group, Ent Air Force Base, Colorado Springs, **Computing the index of refraction of the atmosphere.** Its *Technical Paper*, No. 1, May **1952.** 14 p. 5 figs., 6 refs. **DWB**—In this practical guide, the equation for refractive index is stated and orders of magnitude of temperature and moisture gradients which result in nonstandard radar propagation are given. Superrefraction may be due to a strong temperature inversion (about 3°C/100 ft), a strong lapse in moisture $\frac{1}{2}$ gm/kg/100 ft), or a combination of these factors. (*Same item as* 7F–166, June 1956, *MAB.*) *Subject Headings:* **1. Refractive index computation 2. Inversion effects on radio wave propagation.**—*R. S. Quiroz.*

8I–147 551.501.81:551.594.7

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Wickizer, G. S. and Braaten, A. M., **Field strengths recorded on adjacent FM channels at 93 mc. over distances from 40 to 150 miles.** *Institute of Radio Engineers, N. Y., Proceedings*, 40(12):1694–1699, Dec. **1952.** 14 figs., table, ref. **DLC**—Field strengths of KE2Xcc (93.1 mc, Alpine, N. J.) and WBZ-FM (92.9 mc, Boston, Mass.) have been recorded for more than a year at two locations (Hauppauge and Riverhead) on Long Island. Statistical analysis of data for the evening hours reveals a broad seasonal trend toward higher intensities in the summer, with larger over-all variation on the longer transmission paths. Based on analysis of one summer month, refraction effects appeared to vary independently in two directions. During periods of rapid and violent fading, hourly median field strengths of WBZ-FM varied over a range of 32 db at Riverhead and 25 db at Hauppage. Furthermore, for the above mentioned fading conditions, it was observed that on the 150-mi path, the hourly curves of field strength distribution with time approached a log-normal distribution when the median field was less than 10 db above 1μ v per meter, and a Rayleigh distribution when the median field was greater than 15 db above 1μ v per meter. *Subject Heading:* **1. Radio field strength.** —*Authors' abstract.*

PART III. REVIEWS, TRANSLATIONS AND ANALYTICS FROM RECENT SERIALS AND COLLECTED WORKS

Note: Material listed in these sections will not be included in the monthly indexes until abstracted. The item number is mentioned for those titles which have been abstracted in previous issues of **Meteorological Abstracts and Bibliography.**

A. REVIEWS OF IMPORTANT METEOROLOGICAL MATERIAL

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Flora, Snowden Dwight: **Hailstorms of the United States.** Norman, Univ. of Oklahoma Press, 1956. 201 p. 12 figs., photos, tables, foot-refs. Review in *Scientific American*, 197(1):172–173, July 1957. Review by Hoyt Lemons in *Geographical Review*, 47(4):605, July 1957. (*See* 8.6–8, June 1957, *MAB*)

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